NetworkWorld

April 26, 1999

Volume 16 • Number 1

THE Signature SERIES

THE NETWORK WORLD 200

The biggest companies in networking

East Coast vs. West Coast:
The corporate culture clash

10 hot companies to watch, and a look at how last year's picks have fared

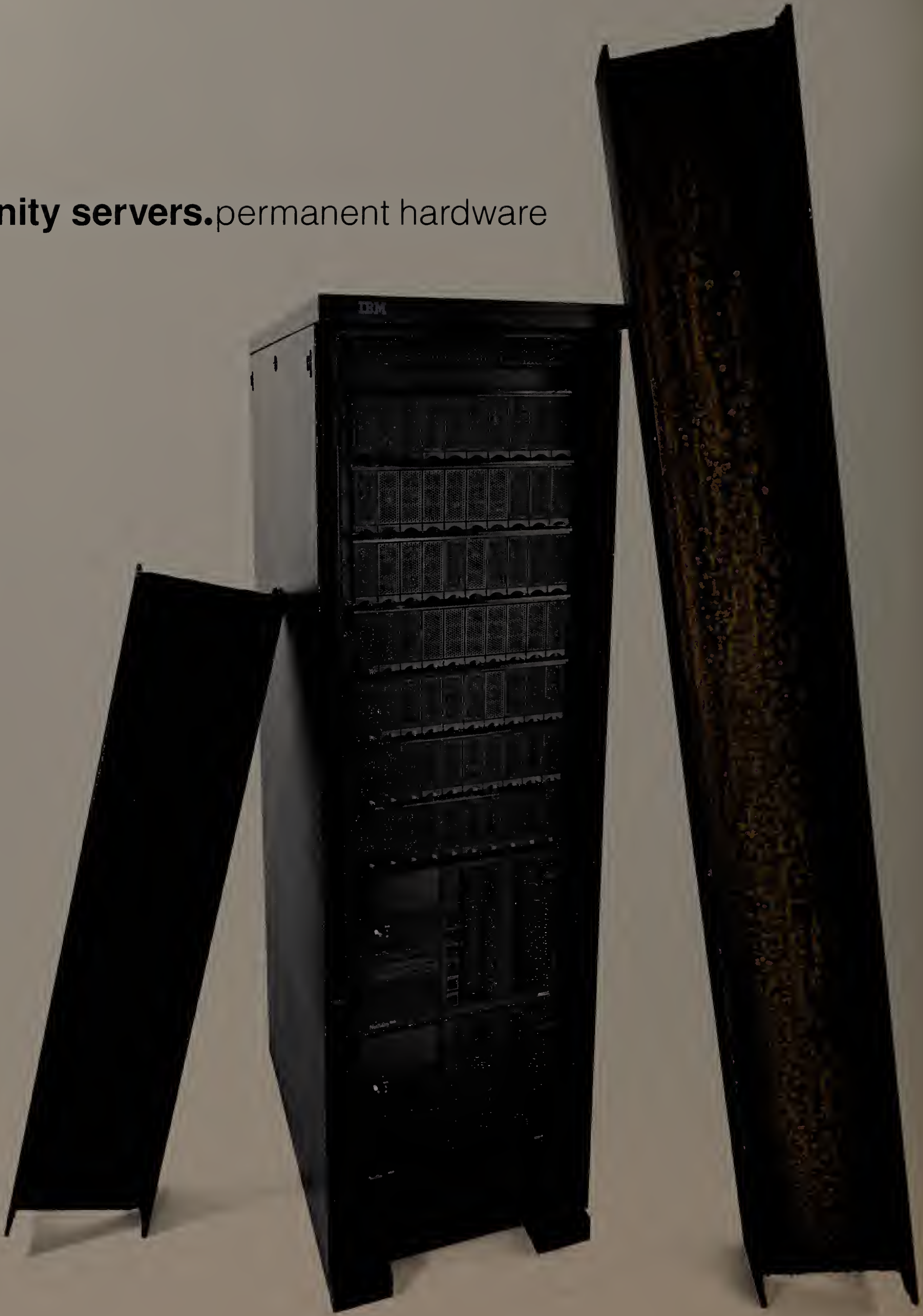
Coffers bulging with billions

The board game: The most desired d

NEWSPAPER

800

netfinity servers.permanent hardware



intel inside
pentium® III
xeon™

*Estimated reseller price to end users for Netfinity 5500 M20 model 866231Y includes IBM 4.5gb Hard Disk Drive. Certain features described are available for an additional charge. Actual reseller prices may vary. mhz denote microprocessor internal clock speed, other factors may also affect application performance. IBM product names are trademarks of International Business Machines Corporation. Microsoft, Windows and Windows NT are registere trademarks of Microsoft Corporation. Intel, the Intel Inside logo and Pentium are registered trademarks and Pentium III Xeon is a trademark of Intel Corporation. ©1999 IBM Corp. All rights reserved

Netfinity 5500
servers for Windows NT

price	from $8,525*
power	up to 4-way Intel® Pentium® III Xeon™ processors 500 mhz, up to 4gb ecc memory
reliability	hot-plug and hot-add PCI component redundancy lightpath diagnostics option: fibre channel storage
notes	Introducing the new Netfinity 5500 M20. Affordable, high-reliability servers for Windows NT.® This is heavy-duty hardware designed for growth and built on enterprise-class availability technologies you won't find in any other server for Windows NT. For full technical specs and implementation information, go to www.ibm.com/netfinity or call 800 426 7255, ext. 4176.

e-business tools

IBM®

WHY A LOT OF X-XEROX CUSTOMERS ARE CONNECTING WITH SAVIN.

(We're tearing up the competition one customer at a time.)

Why are more and more x you-know-who customers turning to Savin for their document output needs? We think the answer is that Savin has exactly what it takes to win people over.

After all, Savin not only has the award-winning, multi-functional digital imaging systems today's networked offices require, we're just as committed to becoming the fastest, most responsive name in the business. With smart, energetic, highly-trained Savin professionals willing to do whatever it takes to give you the satisfaction and service you deserve.

To find out more about Savin's full line of B&W and full-color digital imaging solutions, as well as our unshakable commitment to service, contact us at **1-800-234-1900** or www.savin.com. We think it will be the start of a great relationship.

savin®

WE'VE GOT WHAT IT TAKES TO WIN YOU OVER℠

SAVIN CORPORATION, 333 LUDLOW ST., STAMFORD, CT 06904

999 Savin Corporation

Xerox® is a trademark of XEROX CORPORATION

Free Product info enter NWInfoXpress #64 online @ **www.networkworld.com/infoxpress**

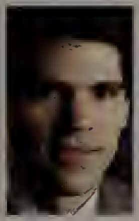
NetworkWorld Fusion
www.nwfusion.com

THIS WEEK ONLINE

Seek and ye shall find. Elsewhere in this issue, you'll find our annual Network World 200 compilation of the biggest in networking. But do your own comparisons. We've used all the information we collected to create an NW200 database that lets you do everything from comparing two or more companies in a variety of categories to seeing who the biggest money losers are. And if you don't like our search criteria, download our spreadsheet and play with the numbers yourself. **DocFinder: 2632**

AT&T's bid for MediaOne. What does it mean? Will the Federal Communications Commission approve it? Would you buy local voice and data services from what would essentially be a souped-up cable company? Discuss it in our forum. **DocFinder: 2634**

Nutter's Help Desk. A user who's getting more and more requests to add remote access to the corporate network finally gets his bosses to OK the plan — as long as he does not spend too much. Ron Nutter tries to help him out with some low-cost options for NetWare and NT (the user has both in his shop). **DocFinder: 2630**



Cable modems. Last week, "Keeping Current" columnist Fred McClimans said cable modems are beginning to win him over: he initially thought the idea just couldn't work. Some users agree, telling us how much they love the devices. But at least one user says he could never get any help with problems and finally cancelled his service to go back to an old analog modem. If you have one of the beasties, what has your experience been? Jump into our forum. **DocFinder: 2631**

How to get onto Network World Fusion

Click on Register on the home page and follow the instructions. Subscribers, keep your NWF number — highlighted on the front cover's mailing label — handy during registration. Nonsubscribers must fill out an online registration form.

NetworkWorld

Table of Contents

APRIL 26, 1999

NMH's Paul Barry chose ATM for the hospital's new net because it will ensure quality of service. Page 22.

NEWS

7 AT&T makes unsolicited bid for MediaOne.
8 Lucent and Extreme join policy mgmt. parade.
10 Is your domain name safe under new plan?
12 Intel to storm Web hosting business.
14 Compaq finds itself at a crossroads.
16 Merger of German, Italian carriers pressures Global One.
18 At long last, Nortel unveils Optivity 9.0.
111 Start-up aims to power e-mail applications into overdrive.
111 Cisco wants to help host your applications.

Network World's
NetWorld+Interop 99 Planner
Find out what's hot at the upcoming Las Vegas trade show. Page 112.

INFRASTRUCTURE

19 Old switches and routers pose Y2K threat.
22 New ATM network is just what the doctor ordered.
28 Dave Kearns: LAN manager reincarnated.

CARRIERS & ISPs

31 Area code problems take backseat to Y2K.
32 Daniel Briere and Christine Heckart: Millionaires wanted — money for the taking.

ENTERPRISE APPLICATIONS

35 Banks and hospitals implement tough security.
35 Candle illuminates Web page use.
36 Scott Bradner: Does Big Blue's Lou have a clue?

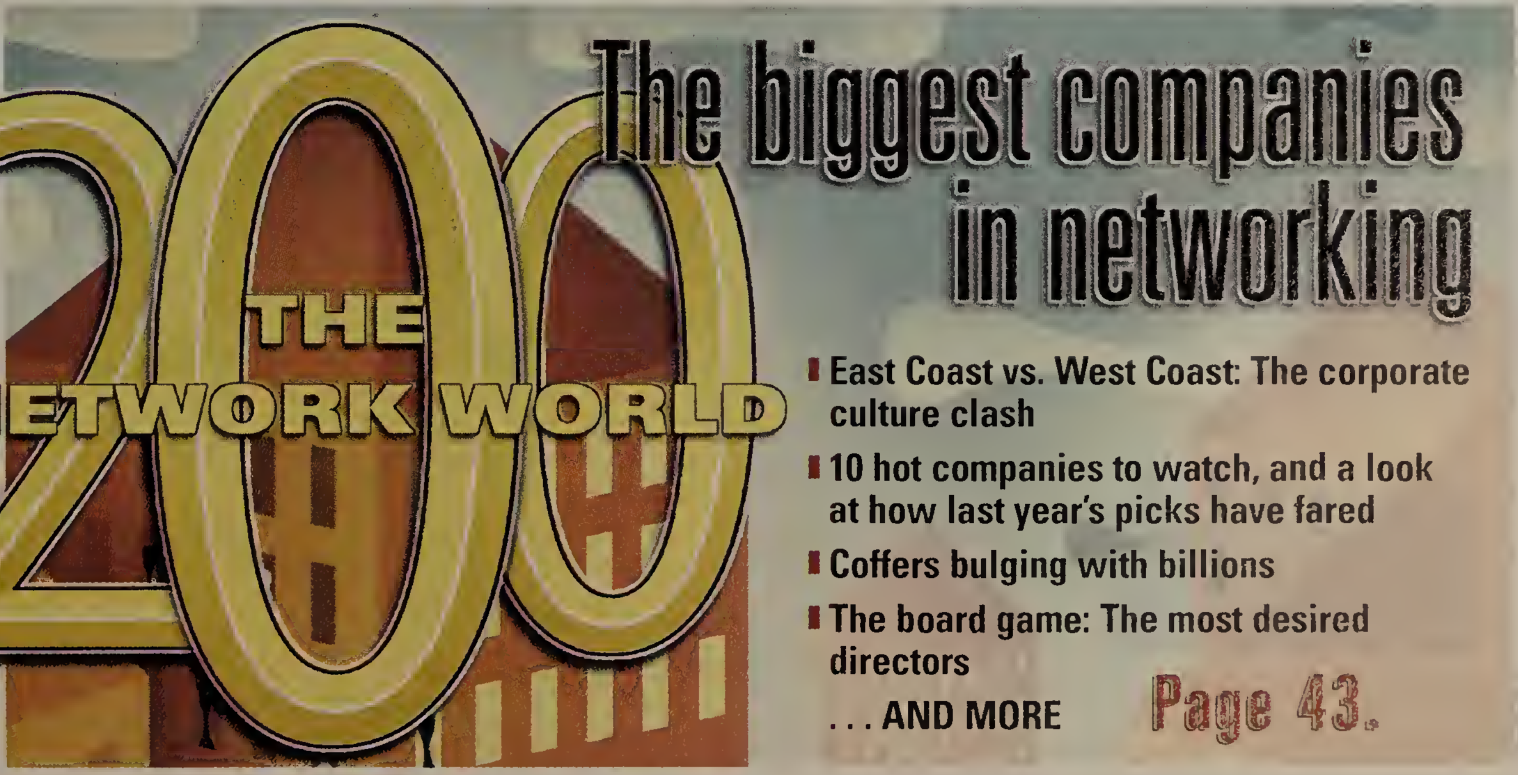
OPINIONS

40 Editorial: The NW200 — Your guide to the network world.
41 Jeff Shapiro: The battle for the desktop operating system — Round II.
41 Howard Anderson: Serving two masters — the real market and the stock market.
114 Backspin: Virtualizing business.
114 'Net Buzz: Free intranet tips and must-see "start-ups."

Net Know-It-All ....Page 12
Message Queue ....Page 40
Editorial and advertiser indexes.....Page 110

HOW TO CONTACT US

WRITE: Network World, 161 Worcester Road, Framingham, MA 01701; CALL: (508) 875-6400;
FAX: (508) 820-3467; E-MAIL: nwnews@nww.com;
CIRCULATION: CALL: (508) 820-7444;
FAX: (508) 270-8869; E-MAIL: nwcirc@nww.com;
STAFF: See the masthead on page 12 for more contact information. **REPRINTS:** (612) 582-3800



The biggest companies in networking

- East Coast vs. West Coast: The corporate culture clash
- 10 hot companies to watch, and a look at how last year's picks have fared
- Coffers bulging with billions
- The board game: The most desired directors

. . . AND MORE Page 43.

[illegible]

1999 Mariposa Technology, Inc. All rights reserved. Access Made Easy! is a trademark of Mariposa Technology

Free Product info enter NWInfoXpress #60 online @ **www.networkworld.com/infoxpress**

News

AT&T aims to boost local access with bold cable bid

Proposed MediaOne buyout could also pave the way for more competitive long-distance market.

BY DENISE PAPPALARDO, DAVID ROHDE AND SANDRA GITTLEN

NEW YORK — AT&T's $58 billion bid last week for No. 4 cable TV operator MediaOne may go a long way toward strengthening AT&T's local service strategy, but it could ultimately make it easier for Bell Atlantic and other regional Bell operating companies to jump into the long-distance market.

AT&T's unsolicited bid, which could stop a planned $53 billion merger between No. 3 cable operator Comcast and MediaOne, is the latest in a series of high-stakes bets placed by aggressive AT&T CEO C. Michael Armstrong. The firm has spent almost $74 billion on four major acquisitions since 1997, when Armstrong took over the reins of AT&T.

AT&T's vision is to be able to offer businesses and consumers Internet access, as well as merged voice and data services over a single network that reaches across the U.S. and the globe.

If AT&T's bid is accepted by MediaOne and approved by regulators — and that should be a battle — the carrier will be the largest cable service provider in the U.S. MediaOne would not comment on AT&T's acquisition bid, which some are calling a hostile takeover effort.

While AT&T is largely investing in cable companies for direct access to consumers, the cable facilities should also give businesses tying telecommuters into their networks another access option.

An AT&T/MediaOne deal could also result in more choice for long-distance services. For example, AT&T is fighting Bell Atlantic's application for long-distance authority in New York. The crux of AT&T's argument is that local telecom markets are still not open, more than three years after enactment of the Telecommunications Act of 1996.

But AT&T's purchase of cable giant Tele-Communications, Inc. (TCI) last June and bid for MediaOne could undercut that argument. Together, the cable networks would reach about 16 million customers through local hybrid fiber coax networks.

Bell Atlantic and other RBOCs are expected to tell the Federal Communications Commission that AT&T's moves into the local consumer market mean it's high time that RBOCs be allowed into the long-distance market. Such a decision could result in AT&T facing a marketing barrage from Bell Atlantic on long-distance voice and data services before AT&T even has a chance to convert its cable systems to telephony and Internet applications.

"As AT&T's direct access to customers grows by leaps and bounds, it becomes harder and harder — indeed impossible — to say there is no local competition," says Robert Blau,

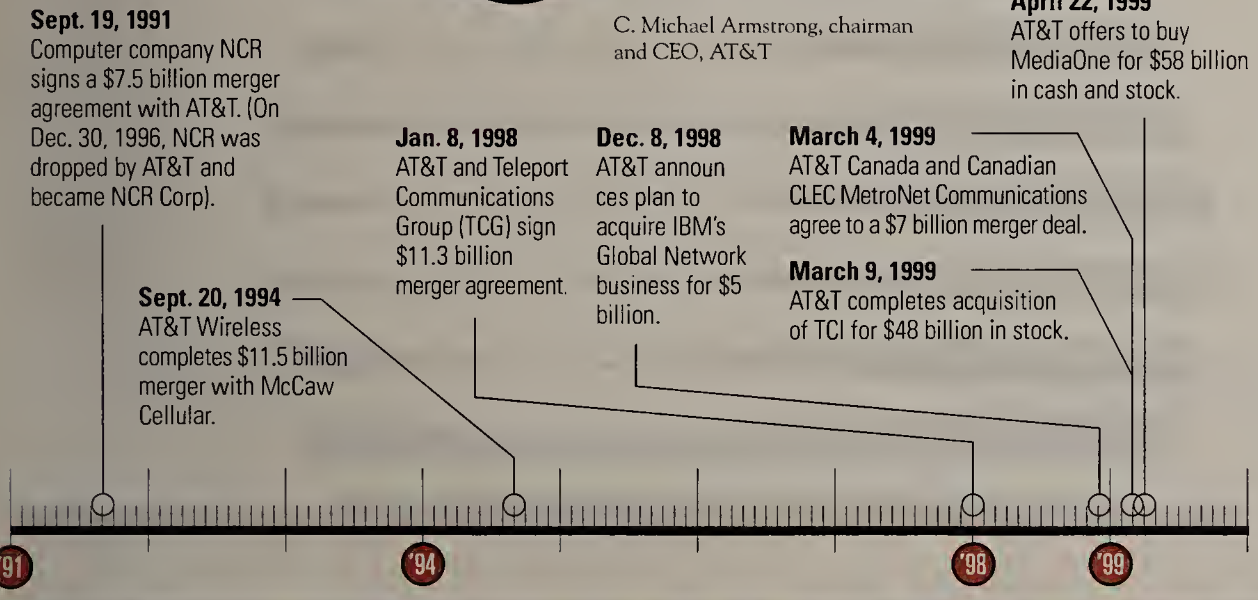
See **AT&T**, page 12

"AT&T cannot afford in the telephony business to simply be a regional player. We must be a national player."

C. Michael Armstrong, chairman and CEO, AT&T

Merger momentum

A sampling of AT&T's merger and acquisition moves this decade.



Sept. 19, 1991
Computer company NCR signs a $7.5 billion merger agreement with AT&T. (On Dec. 30, 1996, NCR was dropped by AT&T and became NCR Corp).

Sept. 20, 1994
AT&T Wireless completes $11.5 billion merger with McCaw Cellular.

Jan. 8, 1998
AT&T and Teleport Communications Group (TCG) sign $11.3 billion merger agreement.

Dec. 8, 1998
AT&T announces plan to acquire IBM's Global Network business for $5 billion.

March 4, 1999
AT&T Canada and Canadian CLEC MetroNet Communications agree to a $7 billion merger deal.

March 9, 1999
AT&T completes acquisition of TCI for $48 billion in stock.

April 22, 1999
AT&T offers to buy MediaOne for $58 billion in cash and stock.

Father of Ethernet switching strikes again

BY JEFF CARUSO

CAMPBELL, CALIF. — It may be hard these days to squeeze more usefulness out of Ethernet technology, but if anyone can do it, it's Vinod Bhardwaj.

Bhardwaj — the so-called father of Ethernet switching — has made a habit out of building practical improvements to this popular LAN technology.

He gained prominence in the industry by starting up Ethernet switching pioneer Kalpana, which he sold to Cisco in 1994.

Bhardwaj's vision of the network in five years is a world in which dollar-per-port Ethernet is possible.

Bhardwaj's latest venture, Antara LLC, will make its enterprise debut at next month's NetWorld+Interop 99 trade show in Las Vegas. The company will unveil Port Authority/IT, a fiber tap that can monitor Gigabit Ethernet traffic without degrading the signal. Antara is joining with Compuware to enable Compuware's EcoScope 4.0 performance monitoring software to analyze data collected by Antara's product.

But this announcement is just the beginning of what could be a string of Ethernet-related products. Antara emerged from ControlNet, a "start-up incubator" run by Bhardwaj that represents a new approach to developing network gear.

In one or two years, Bhardwaj expects to launch a start-up focused on providing the bandwidth required to send real-time traffic, such as video, over a network. With silicon adding more capabilities all the time, Bhardwaj says he is looking to push Ethernet prices as low as $1 per port in five or six years, especially in the emerging home network market.

Instead of building a start-up from scratch every time he has a new idea, Bhardwaj has built a structure to create multiple start-ups at low cost. ControlNet has the human resources and administrative infrastructure in place for each start-up. Plus, Bhardwaj is constantly developing ideas through a team of about 60 engineers in India. "If you do technology development in India, even the engineers are almost free," he says.

Bhardwaj adds that he can develop technology at about a quarter of the cost he would incur if he had to build start-ups in the U.S. from scratch. ControlNet is funded mainly from money Bhardwaj gained from selling Kalpana to Cisco. This way, he does not have to rely on venture capital money to get started.

ControlNet develops a lot of technology, but only some of it is used. Past endeavors include a version of Ethernet that ran at 400M bit/sec and an "RSVP switch," a precursor to today's

See **Bhardwaj**, page 18

NETWORLD+INTEROP 99

JASON GROW/SABA

ControlNet's Bhardwaj is funding new projects with money from the sale of Kalpana to Cisco.

NEWS BRIEFS, APRIL 26, 1999

Iridium CEO does the big hangup

Troubled satellite network service provider Iridium received another blow last week when its CEO, Edward Staiano, resigned. Staiano's resignation was due to a strategy disagreement with Iridium's board, an Iridium spokesman says. Staiano follows Roy Grant, the company's former chief financial officer, out the door. Iridium operates 66 satellites that enable wireless phone calls virtually anywhere in the world. But the promise of that service has been dimmed as the firm has not met revenue expectations nor subscriber numbers. The firm's stock price has plummeted about 75% since last May. Production and quality problems as well as poor distribution of phones have also plagued the company. Iridium says its board of directors formed an executive committee to manage day-to-day operations and appointed board member John Richardson as interim CEO.

STEVE BORNS

CEO Staiano bids Iridium sayonara.

Protect your PC

A virus that can wipe out PC hard drives and generally make life miserable could strike today. The malignant code, known as CIH, has been turning up on the 26th day of each month for months, but experts say the version expected to rear its head today is the worst variation. Experts also say if you have the latest antivirus software, you should be protected against CIH. The CIH virus is more malicious to individual computers than Melissa, the bug that wreaked havoc last month. That's because CIH actually destroys data. The virus can also keep a computer from starting up by infecting the basic I/O system. Carnegie Mellon's Software Engineering Institute, which runs the Computer Emergency Response Team, has issued information about the virus at www.cert.org.

High-speed hands across the sea

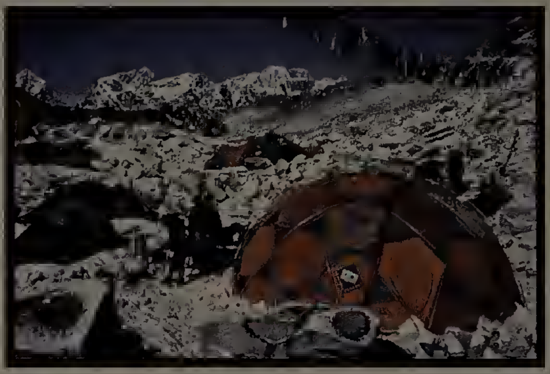
Level 3 Communications last week said it plans to lay down a high-speed trans-Atlantic Internet cable system. The 1.2 terabyte/sec system would link Level 3's high-speed networks for Internet transmissions in the U.S. with the carrier's network resources in Europe. Level 3 is building a 16,000-mile network to some 50 U.S. cities and a 3,500-mile network that would connect 15 European cities. The trans-Atlantic pipe is expected to cost between $600 million and $800 million and be in service by September 2000.

CA plants e-commerce stake

Computer Associates last week carved out a new division, dubbed interBiz Solutions, aimed at the e-commerce market. The division is developing a "business management framework" called BizWorks that will let users manage systems and business applications from a central location. CA executives say in some cases BizWorks will look exactly the same as CA's existing Unicenter product, but executives were vague about the new framework's particulars. BizWorks will draw from CA's financial banking and enterprise resource planning software, and is expected out in the second half of the year.

Hey doc, that stethoscope is a little cold

This sounds like an event from the Medical School X-treme Games. A group of 15 climber/physicians last week began scaling Mount Everest in a quest to test telemedicine technology as part of Everest Extreme Expedition '99. The group will operate from a base camp at 17,000 feet and higher for six weeks, studying the effects of high-altitude and low-oxygen conditions on the human body. Using a combination of satellite technology, ISDN and videoconferencing, doctors and scientists at Yale University will be able to conduct real-time monitoring of their remote "patients." The Yale-based doctors will also conduct virtual rounds each day, with the video being multicasted to other universities across Internet2.


SCOTT HAMILTON

News, entertainment and business all in one package

CBS last week announced it is acquiring a one-third equity stake in Office.com, an online business service managed by WinStar Communications that is aimed at small and mid-size businesses.

CBS President and CEO Mel Karmain says the investment in Office. com is an attempt to deliver new media services to people looking for daily news, entertainment and business information in one place. In exchange for the equity stake, Office.com gets $42 million in promotion and advertising over six years across CBS's media properties.

Lucent and Extreme join policy mgmt. parade

BY JEFF CARUSO

Lucent and Extreme Networks this week will add their voices to the cacophony of vendors pitching policy-based management wares.

In separate ventures, both companies will let network managers determine which users have access to different network resources by setting central policies. Both firms' announcements follow on the heels of similar product introductions from Hewlett-Packard, Cisco and others.

Policy-based network management is still a very new area, with hardware and software vendors just now releasing products to implement the technology. Because they're new, many policy-based management tools provide limited capabilities for only a few brands of network hardware. Lucent and Extreme support Cisco routers in addition to their own LAN switches. Extreme also supports Xedia WAN routers.

Though many tools are limited, "the concept sounds great," says Virgil Palmer, director of telecommunications at Air Products and Chemicals in Allentown, Pa. Palmer says he would like to give Internet cruising a low priority and protect "very sensitive revenue-generating traffic in our call center."

But analysts point out that because the tools available now provide policies for just a few brands of equipment, enterprises with multivendor networks will have to wait until the tools support a wider variety of network hardware. "We seem to be an awfully long way from that," says Dave Passmore, research director at NetReference in Sterling, Va.

Another option is to consolidate an enterprise network around a single vendor's hardware, says Charles Rutstein, an analyst at Forrester Research in Cambridge, Mass.

Other challenges posed by policy-based management include creating a network directory, which in many enterprises doesn't exist, Passmore says. And even if policy-based management software works as advertised, IT managers are left with the thorny political problem of figuring out which employees or departments get preferred access to the network, he says.

For those who want to attempt policy-based management, Extreme is introducing its Enterprise Policy System, a server software package. Net managers use a Web interface connected to the server software to set policies, such as how much bandwidth users and applications should get across the network. The server in turn sends messages to Extreme, Xedia and some Cisco devices, telling them to enforce the policies.

Previously, network managers could allocate bandwidth on Extreme gear, but had to configure each box separately.

Extreme's server software runs on Windows NT or Sun's Solaris. It will ship in July as part of ExtremeWare Enterprise Manager 2.0, which costs about $10,000.

Lucent's RealNet Rules works similarly. It allows network managers using a Java client to specify policies on server software running on NT and Solaris. The server translates policies into commands understood by some of Lucent's Cajun LAN switches and some Cisco routers.

Lucent's software is expected to ship in the third quarter of this year for $10,000 per server.

Extreme: (888) 257-3000; Lucent: (888) 458-2368

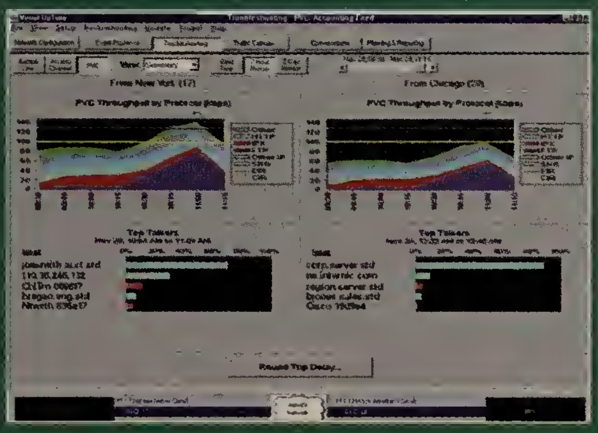
More Online

- Policy-management primers.
- Overviews of policy-management announcements from other vendors.

DocFinder
FIND IT 2636 ON FUSION
www.nwfusion.com

How can you reduce the cost of WAN downtime?

Make it Visual.



VISUAL NETWORKS®

THE WAN SERVICE LEVEL MANAGEMENT LEADER.

Free Infonetics White Paper "Cost of WAN Downtime" • www.visualnetworks.com/nw

©1999 Visual Networks, Inc. Visual Networks is a registered trademark of Visual Networks.

Free Product Info enter NWInfoXpress #66 online @ www.networkworld.com/infoxpress

Is your domain name safe under new plan?

BY SANDRA GITTLEN AND DENISE PAPPALARDO

WASHINGTON, D.C. — Over the next few months, a group of ISPs will begin bundling domain name registrations with their Internet business services.

While the move sounds the start of competition in this market, it raises a serious question for users: Who owns the domain if ISPs offer domain name registration as an add-on to Web services?

CHRISTOPHER FITZGERALD

Kosher Grocer owner Deborah Alexander says users should write domain ownership into their ISP contracts.

The Internet Corporation for Assigned Names and Numbers (ICANN) last week announced that five companies, including America Online, will participate in a test bed for a new domain name registration system designed to end Network Solutions, Inc.'s (NSI) monopoly. With the test bed, the new registrars will hook into NSI's database in order to sell a pool of names in the .com, .net and .org domains.

ICANN also unveiled a list of 29 companies, including AT&T and Verio, that will enter the domain game after the test bed is completed in July.

Currently, users register their domains with NSI or through an ISP that passes on the $70 two-year registration fee to NSI. In either case, NSI recognizes the user as the direct owner of the domain name, which can be used to establish a company's online brand through URLs and e-mail addresses. NSI also lets users switch Web hosts without paying additional fees or losing their brands.

Under the new system, ISPs selected by ICANN can process registrations themselves. Already, ISPs are developing ways to offer domain registrations free. For instance, some ISPs will forego passing on to customers the $18 shared database fee owed to NSI if customers choose the ISPs to host their Web sites.

By bundling the registration, the lines are blurred about who owns the domain, leaving room for ISPs to hold customers hostage by saying the customers lose their domain if they switch ISPs.

For Deborah Alexander, owner of online Jewish foods distributor Kosher Grocer, this is a frightening prospect.

Alexander has switched ISPs twice and is about to switch again. She also is in the process of registering more than a dozen new domains. Alexander says that if her brand were attached to her Web hosting contracts, she would be tied to one provider and not be able to get a better deal.

"The only way this is going to work is if you write into your contract that you own the domain," she says. "If your domain keeps changing, you'll have no name recognition."

Doug Armentrout, vice president of Web services at Verio, agrees. "Customers should get the details of who owns the domain spelled out in a contract," he says. While Verio plans to hand over domains to users, he says "there are a lot of smaller ISPs out there that will use domain registration as a way to retain customers."

"There is no real benefit to AT&T's customers if we hold ownership of domain names, so I doubt we would do that," says Rose Klimovich, director of IP services at AT&T. But AT&T is still in the process of establishing how the carrier may integrate domain name registration with existing services such as Web hosting, she says.

AOL says it also has not determined how the company will blend in its new role as registrar with its existing services.

ISPs that have been approved as registrars could potentially register a block of domains themselves, then lease them to customers. Armentrout says ICANN should create guidelines to prevent this.

While ICANN has ideas concerning domain portability, ICANN President Mike Roberts says there is no rule by which registrars have to abide. ◪

Windows 2000 faithful still cautious about Beta 3

Microsoft partners back NOS as users await software.

BY JOHN FONTANA

Microsoft last week may have revealed a who's who list of partners for Windows 2000, but reaction from some network administrators was more along the lines of, "Who cares?"

The pressing issues for customers are scalability, performance, manageability and integration. Most administrators are waiting for those qualities to be proven before they roll out the software. To begin providing that proof, Microsoft says more than 50 companies, including itself, will begin testing Windows 2000 Beta 3 this week. Other organizations involved include NASA and Prudential Insurance.

Microsoft officials also say Beta 3 will help solve other issues, with new features including configuration wizards to ease setup of IntelliMirror, a tenfold increase in the number of device drivers and a lockdown feature for Sys32 that helps prevent Dynamic Link Library conflicts.

With Beta 3 expected to ship this week, some users are ready to get started and some are optimistically cautious.

"We intend to build a pilot architecture parallel to our production architecture using Active Directory and populate it with accounts from the production side," says George Lioudis, vice president of systems engineering for Prudential Insurance. The Beta 3 pilot will not handle any production transactions among Prudential's 65,000 desktops and 1,200 servers.

Lioudis says he expects Active Directory will solve scalability issues by letting him manage his large user base from a single point. He also has built a strategy for policy-based management on top of IntelliMirror, which allows end users' desktop configurations to be stored on the network and accessed from any machine.

Lioudis says he has faith that Prudential's pilot will be a springboard to a rapid Windows 2000 deployment once the software is released.

But he is not without concerns. For example, Lioudis needs tools to integrate his NT 4.0 clients and servers into the Windows 2000 environment during migration. In addition, he could use a bridge between the Windows 2000 Installer feature for software distribution and NT 4.0. Currently, software installed using the Windows 2000 feature does not work with NT 4.0, forcing network administrators to use Microsoft's Systems Management Server.

Lioudis also needs to create an administration team for Active Directory.

Other users are taking things a little more slowly.

"I can guarantee you we are not one of the 50 early adopters," says a network administrator at Lucent who asked not to be named. "We would not put this product in our production environment right now."

Windows 2000 backers

Though the third beta of Windows 2000 is just being released, many big name companies have already pledged their support for the new network operating system. Here's a sampling:

Company	Support focus
3Com	Telephony, remote access
Compaq	Servers
Computer Associates	Management services
Dell	Servers
Hewlett-Packard	Network, systems management
IBM	PCs, applications, services
Seagate Software	Backup, recovery, support
Wang Global	Systems integration

He says Lucent is excited about the possibilities of Active Directory, which will replace a proprietary directory currently in place. Lucent, which has six to 12 people in a test environment, is also encouraged by the results of its benchmark tests of Windows 2000 beta software, he says.

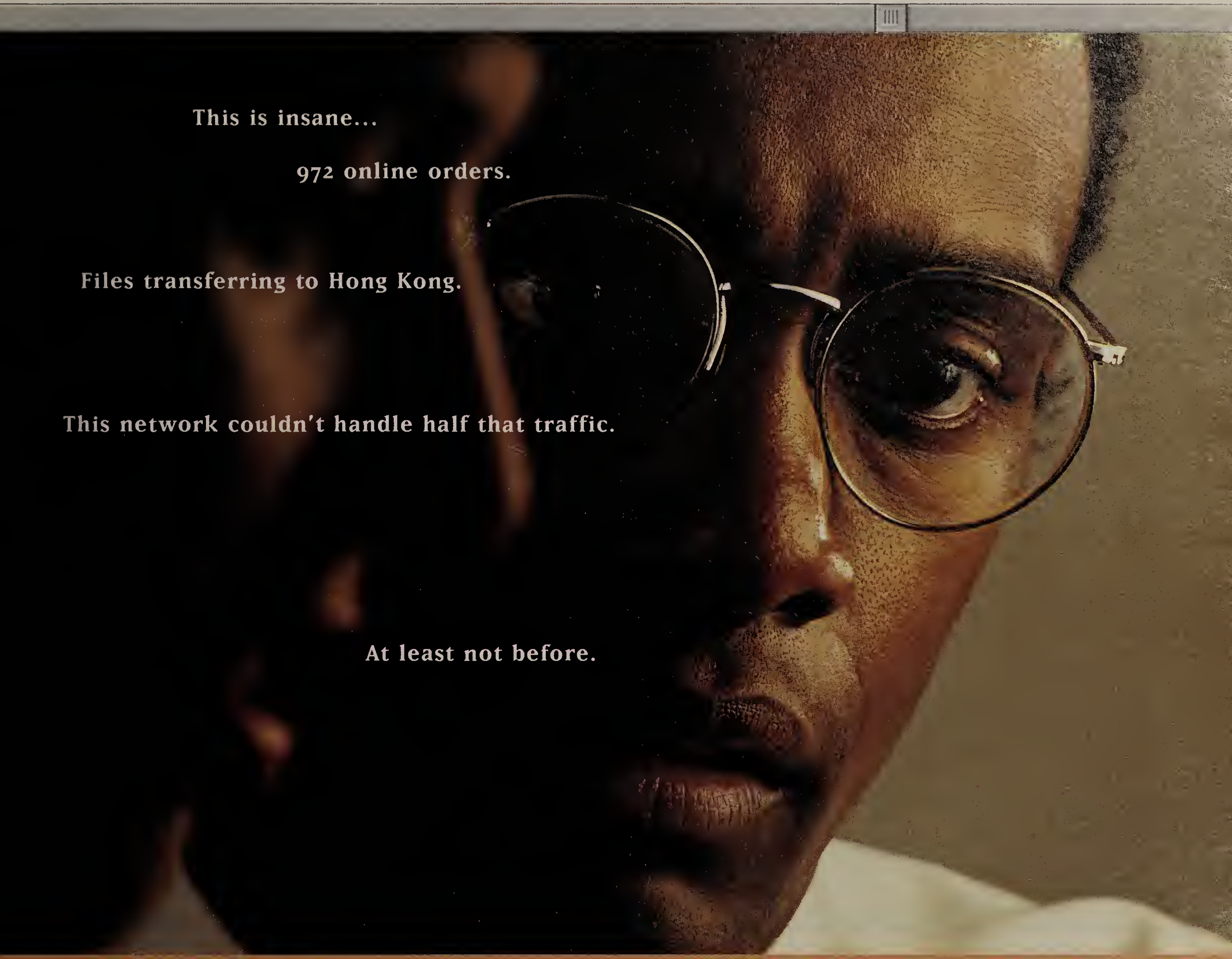
But one of the overriding issues for Lucent is the lack of drivers for the hundreds of different peripherals the company uses and the fact that its home-grown applications have not been rewritten for Microsoft's new network operating system.

It appears, however, that Beta 3 may address a lot of Lucent's concerns, according to Jonathan Perera, Microsoft's lead product manager for Windows 2000. In addition to increasing driver coverage in Beta 3, Microsoft has been working with its developer network on tools for migrating home-grown applications to Windows 2000, he says.

Microsoft last week bolstered momentum behind Windows 2000 by announcing support from some 20 OEMs and from key systems integrators, such as Andersen Consulting. Microsoft also launched an application-compatibility Web site that includes a list of 2000-compliant applications and patches. ◪

IBM readies its key applications to exploit Windows 2000. www.nwfusion.com, DocFinder: 2637

Internet. Intranet. Extranet. >>> AT&T net.working puts them all together.


This is insane...
972 online orders.
Files transferring to Hong Kong.
This network couldn't handle half that traffic.
At least not before.

With AT&T net.working, your networks can communicate as one. However many different networks you depend on, the power and support of AT&T enables them to work together. So you get the flexibility and speed of the Internet with the control and security of a private network. Which makes everything from sharing data with an overseas office to conducting business over the Web happen seamlessly. It's another highly intelligent solution from AT&T.

Start your net.working℠
Visit www.net.working.att.com

©1999 AT&T

AT&T net.working℠

AT&T

Intel to storm Web hosting market

BY JOHN DIX

NEW YORK — Intel last week surprised Wall Street analysts by using a securities briefing to reveal that it will enter the Web hosting business.

Halfway into a four-hour briefing here, hosted by Intel President and CEO Craig Barrett and featuring talks by other top Intel executives, the company disclosed its intention to build what it is calling Internet Data Service (IDS) centers.

Gerry Parker, executive vice president and general manager of Intel's New Business Group, says the plan for Intel is to become a leader in hosting, storage and delivery of Web content, a business that some forecast will grow to $12 billion by 2002.

Intel's idea is to bring scale to a market that has been dominated to date by smaller players, and to put an emphasis on reliability.

Asked what experience Intel has that would encourage it to tackle this market, Parker says building semiconductor fabrication plants has taught Intel how to build large-scale global facilities. The company is familiar with scale economics, capacity planning and even running 24-7 data centers. What's more, Intel will employ its time-honored practice of perfecting a plant design at one site before building exact replicas at other locations worldwide.

But Ellen Hancock, CEO of Exodus Communications, one of the leading Web hosting service providers, says the only similarities between building semiconductor fabrication plants and data centers are bricks and mortar. While Hancock believes Intel has a very successful management team in place, she says the company has far more expertise in offering products than services.

Intel is currently building a test and development data center at a company campus and expects to complete it in June. The first production data center, IDS1, is scheduled to go online in September. IDS2 will open in Europe in the third quarter, with worldwide expansion scheduled for the first half of 2000.

The data centers will range in size from "small" shops housing up to 2,000 servers and costing about $50 million to build, to large $100 million shops with up to 5,500 servers. All IDS centers will be networked so content can be distributed — just how that will be achieved was left unanswered.

Intel's first customer is Excite, which two weeks ago entered into a co-development agreement with Intel to develop an online shopping service.

Not all observers are convinced that the skills Intel possesses are easily transferred to this type of venture. Carl Howe, director of computing strategies for Forrester Research in Cambridge, Mass., sees Intel's attempt to get into the Web hosting business as a "big stretch."

Howe, who launched GTE's Web hosting business in 1994, says, "it's a tougher business than people think. Hosting content for another company is very different from hosting your own."

Among other things, Howe wonders about the competitive implications for Intel. After all, at the same analyst briefing the company described how it would be using its powerful new Pentium III to chase the ISP server market, which is a traditional stronghold of Sun.

"If I'm UUNET, am I going to want to buy a ton of Intel servers if they compete with me for hosting business?" Howe asked. ◪

Intel's Web hosting plan

Intel plans to provide Web hosting services at networked Internet Data Service (IDS) centers that can support up to 5,500 servers.

June 1999
Complete test/development of IDS center, bring early customers online.

September 1999
First production center, IDS1, online and ready for North American customers.

Third-quarter 1999
IDS2 online in Europe.

First-half 2000
Worldwide data center expansion.

AT&T,

continued from page 7

BellSouth's vice president of federal regulatory affairs.

The road ahead for regulatory approval of any MediaOne deal could be long. Two senior members of the Senate antitrust subcommittee indicated they are going to take a close look at this new deal if MediaOne accepts AT&T's offer.

"If the MediaOne deal creates increased local telephone competition, that's good," said Sen. Michael DeWine (R-Ohio) and Sen. Herbert Kohl (D-Wis.) in a joint statement. "But in many ways it raises a whole host of tough questions regarding cable concentration. Lawmakers and regulators are going to take a serious look at this takeover attempt."

One likely area of examination: an FCC ruling that AT&T does not have to open the TCI network to competitors, including non-AT&T ISPs that want to use the TCI pipe to offer broadband services. If AT&T continues to buy cable companies so it can advertise nationally and be confident of reaching most consumers, pressure will grow on the FCC to open all of AT&T's cable lines, just as RBOC last-mile facilities are supposed to be open to leasing by RBOC competitors.

AT&T's local market strategy creates competition, says Daniel Briere, president of TeleChoice, a consulting firm in Boston. But it will take AT&T about two years before the carrier is able to upgrade its network to support two-way traffic such as voice services, so the FCC may still hold off giving Bell Atlantic the nod to offer long-distance services.

Meanwhile, AT&T clearly does not want to be dependent on incumbent local exchange carriers to bridge the carrier's long-distance customers to local networks around the country. AT&T cannot resell competitors' services, and owning digital, high-speed networks throughout the U.S. will let AT&T differentiate itself from other carriers, Armstrong says.

"AT&T cannot afford, in the telephony business, to simply be a regional player," Armstrong says. "We must be a national player."

While AT&T's goal is to be a force in the local market, it could also get a big boost with MediaOne's high-speed Internet access services. MediaOne has aggressively rolled out a 10M bit/sec cable modem service called MediaOne Interactive. Of MediaOne's five million customers, 84,000 subscribe to this service. This is a much higher concentration of broadband service customers than AT&T has right now through its TCI acquisition. Of AT&T Broadband's 10.7 million cable customers, only 29,000 are using broadband services. ◪

Correction

A recent article about Netrix switches (*NW*, April 19, page 20) should have stated that Transaction Network Services has 45 sites and 300,000 end users.

Be a

Net Know-It-All

For the answer to this week's question and more net trivia, visit Network World Fusion and enter 2467 in the DocFinder box.

This week's question:

Who did Eckhard Pfeiffer replace as Compaq's CEO back in 1991?

NetworkWorld

Editor in Chief: John Gallant
Editor: John Dix

NEWS
News Editor: Doug Barney
News Director: Bob Brown
Associate News Editor: Michaal Cooney
(508) 875-6400

NETWORK WORLD FUSION
Online Editor: Adam Gaffin, (508) 820-7433
Senior Online Reporter: Sandra Gittlan, (508) 820-7431
Staff Writer: Jason Meserve, (508) 820-7567
Online Copy Editor: Sharyl Hodge (508) 820-7532

INFRASTRUCTURE
Senior Editor: John Fontana, (303) 377-9057, Fax: (303) 377-9059
Senior Editor: John Cox, (978) 834-0554, Fax (978) 834-0558
Senior Editor: Jeff Caruso, (650) 358-4515, Fax (650) 358-4518
Senior Editor: Deni Connor, (512) 345-3850, Fax: (512) 345-3860
Senior Editor: Jim Duffy, (508) 820-7525
Senior Writer: Marc Songini, (508) 820-7484

CARRIERS & ISPs
Senior Editor: David Rohda (202) 879-6758; Fax: (202) 347-2365
Senior Editor: Tim Graane, (508) 820-7422
Senior Editor: Danise Pappalardo (202) 879-6745; Fax: (202) 347-2365

ENTERPRISE APPLICATIONS
Senior Editor: Robin Schreiar Hohman, (203) 459-9948
Senior Editor: Ellan Messmar, (202) 879-6752, Fax: (202) 347-2365
Senior Editor: Paul McNamera, (508) 820-7471

COPY DESK/LAYOUT
Managing Editor: Charlay Spektor
Copy Chief: Malissa Shaw
Copy Editors: Lisa Kaplan Adase, John Doolay, Danise Dubia, Melissa Rayan
News Layout Editor: Lisa Kaplan Adase

ART
Design Director: Rob Stava
Associate Art Director: Tom Norton
Deputy Art Director: Allyson Nickowitz
Assistant Art Director: Paul M. Laa
Graphic Designer: Lisa Hovsepian
Online Designer: John Fischer
Infographics Researcher: Phil Hochmuth

FEATURES
Features Editor: Paul Dasmond, (508) 820-7419, Fax: (508) 820-1103
Managing Editor, Features: Amy Schurr, (508) 820-7485, Fax: (508) 820-1103
Features Reporter: Neal Weinberg, (508) 820-7449, Fax: (508) 820-1103
Associate Features Editor: Susan Collins, (508) 820-7413, Fax: (508) 820-1103
Associate Features Editor: Suzanna Gaspar, (508) 820-7489, Fax: (508) 820-1103

REVIEWS
Test Center Director: Lae Schlesingar (508) 820-7416
Test Alliance Director: Christine Burns (508) 820-7456
Reviews Editor: Ann Sullivan (508) 820-7408

Test Alliance Partners: Merk Gibbs, Gibbs & Co.; Joel Snyder, Opus One; Dennis Williams, ProductReviews.com; John Bess, Centennial Networking Labs; Steve Bell, Silicon Valley Networking Laboratory, Bob Currier, Duke University

Contributing Editors: Daniel Briere, Merk Gibbs, James Kobielus, Mark Miller

SIGNATURE SERIES
Executive Editor: Beth Schultz, (773) 283-0213, Fax (773) 283-0214
Senior Editor: Julie Bort (970) 468-2864, Fax: (970) 468-2348
Art Director: Tom Norton
Deputy Art Director: Allyson Nickowitz
Senior Copy Editors: Melissa Reyen, Danisa Dubia

Editorial Operations Manager: Cheryl Crivello
Office Manager, Editorial: Glanna Fasold
Editorial Assistant: Pat Josefek
Research Assistant: Deidra Massanberg

New PC power
for the Net.

*Information on Intel products and year 2000 is available at www.intel.com or at 800-628-8686. © 1999 Intel Corporation. All rights reserved. Intel, Intel Inside and Pentium are registered trademarks, and Pentium III Xeon and "The Computer Inside" are trademarks of Intel Corporation. All other brands and trade names are the property of their respective companies.

The new Pentium® III processor.
More power for your network, the Internet and beyond.

intel inside
pentium III

It's a wired world. That's why you need the new Intel® processor designed for the Net: the Pentium® III processor. It gives you more power to run today's Net-based applications. And more power on the client can mean less stress on the Net. The Pentium III processor also helps you keep track of your networked resources. And, working in concert with a Pentium® III Xeon™ processor-based server, you have a powerful combination for your connected business. To learn more about the Pentium III processor, visit us on the Web, where you'll also find information on Intel® products and year 2000.* ► www.intel.com/IT

intel
The Computer Inside.™

Compaq finds itself at crossroads

Company to refocus in wake of CEO firing.

BY DENI CONNOR

HOUSTON — Having survived one of the worst weeks in its history, Compaq now needs to figure out what it really wants to be: a box manufacturer or a provider of end-to-end enterprise hardware, software and services.

Analysts and users reacting to last week's ousting of Compaq CEO Eckhard Pfeiffer and the company's disappointing first-quarter financial results say the company's best bet is to go the enterprise systems route.

Compaq has blamed its financial problems on the poor performance of its PC business, where the company has been locked in a tough price war with Dell and others.

Observers say Compaq has collected the high-end server and Internet products as well as the service and support expertise needed to go head-to-head against the likes of IBM and Hewlett-Packard for enterprise accounts.

The company's top priority, they say, should be to better integrate the technologies and professional services personnel it has obtained through its Tandem, Digital and various electronic commerce company acquisitions.

"If Compaq focuses on Dell it will miss the mark," says Valerie O'Connell, an analyst with Aberdeen Group in Boston. "Compaq covers so much more than Dell; it is in a different league."

Observers agree with Compaq Chairman and acting CEO Ben Rosen, who last week said the company needs to speed up decision-making regarding other technologies, such as storage, Internet and high-end server products.

"Compaq doesn't have a good vision of where it wants to go with the takeovers," says Esmeralda Silva, a research manager at International Data Corp. in Framingham, Mass.

Product strength

Compaq's greatest strength is its wide range of product offerings, including its Alpha servers and storage-area network products, says Hal Kuff, systems and network manager at Tesco Technologies, a Digital equipment user in Hunt Valley, Md. He says Compaq needs to be more decisive about where these products are headed than it was about internetwork gear. Compaq seriously scaled back its internetwork efforts late last year after several starts and stops (*NW*, Jan. 11, page 1).

Others say Compaq should press ahead with e-commerce and Internet products and services even though the company has been rather late to enter these markets.

Two weeks ago at Compaq's annual Innovate Forum 99 user conference, the company announced an electronic-business strategy based on Tandem's NonStop computers.

Compaq also owns AltaVista search engine technology obtained from Digital, among other Internet technologies.

"Compaq has developed a good foundation to springboard itself ahead of its competition as a total e-business solutions provider," says Thomas Frederick, client technology manager for IT at Johnson Controls' Automotive Systems Group in Plymouth, Mich. "If they muck around and take time to get organized, they are going to lose a big business opportunity."

Not all bad

All of this is not to say that Compaq has not made some progress integrating the various technologies it has collected via acquisitions.

For example, Compaq has brought together Windows NT, OpenVMS and Unix storage products under its $5-billion-per-year StorageWorks business, which is largely based on technology obtained via the Digital acquisition. The company's storage business grew from the fourth quarter of 1998 to the first of 1999.

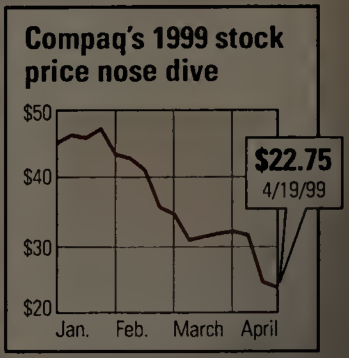
Compaq has also started to integrate Digital's service and support organization with its own and has developed new services and programs, such as CarePaqs, which are designed for small and mid-size businesses.

And on the server side of the house, Compaq has announced plans to move its Tandem NonStop S-Series computers to the 64-bit Alpha microprocessor platform.

Senior Writer Marc Songini and Senior Editor John Fontana contributed to this story.

What a difference a quarter makes

A tough first quarter, which featured a sagging stock price and slowing revenue, led to CEO Eckhard Pfeiffer's ousting.


Compaq's 1999 stock price nose dive

JOHN ABBOTT

". . . With our strong fourth-quarter results, we enter the new year with a great deal of momentum and optimism."

Compaq CEO Eckhard Pfeiffer, Jan. 27

"Despite our overall corporate strength, our first-quarter results are disappointing and unacceptable."

Compaq Chairman and acting CEO Ben Rosen, April 21

WHO SHOULD REPLACE PFEIFFER?

Compaq Chairman and acting CEO Ben Rosen last week said the company's ideal replacement for departed CEO Eckhard Pfeiffer is a "global leader with technologic knowledge." Executive recruiters interviewed by *Network World*, however, say Compaq should be looking for an executive with a different résumé.

First and foremost, the company needs someone who is decisive and can execute quickly, recruiters say.

"Compaq needs a person like AT&T's C. Michael Armstrong, who came in to a bloated behemoth — an old-line, stodgy, bureaucratic company — and just started kicking ass," says Chip McCreary, president of Austin-McGregor International, an executive recruitment firm in Dallas.

"Eckhard Pfeiffer did a great job of getting Compaq to the No. 1 position, but when he was faced with very tough decisions in laying off employees and consolidating divisions, he ran out of gas," McCreary says. "The day after Pfeiffer acquired Digital was the day he should have resigned and said 'I need a new horse.' "

The person who becomes Compaq's new CEO has to understand four things — "the Internet, the server technology Compaq brought on board from Digital and Tandem, how to get back into the corporate accounts, and the value of the people who work for Compaq," says Hank Stringer, president of world.hire in Austin, Texas.

That person doesn't need to be a "computer guy," Stringer says, but he must have worked at large companies.

And Compaq must be willing to pay, McCreary says.

"The compensation plan is going to have to be big — this is a turnaround after all," he says.

— Deni Connor

See us in booth #5433
at N + I Las Vegas

Give your world a big push with a simpler, more scalable network for the new enterprise. We're talking about the Extreme Networks™ Summit™ and BlackDiamond™ Layer 3 switches. They combine Gigabit Ethernet, wire-speed performance and Policy-Based Quality of Service to give new enterprise applications a well-deserved push.

So now, you can run everything from ERP to e-commerce, from voice-over-IP to co-located server traffic. No sweat. And because our switches share the same hardware, software and management architecture, they're easier to manage and can actually reduce your network ownership costs.

For more information, call us or visit our web site. It could be just the push everybody in your company needs.

extreme networks

Networking The New Enterprise™

www.extremenetworks.com
800-822-3206 (U.S.)
+1 818-865-2811 (Outside U.S.)

© 1999 Extreme Networks, Inc. All rights reserved. Extreme Networks, Summit, BlackDiamond, Networking the New Enterprise and the Extreme Networks logo are trademarks of Extreme Networks. All other company names or products are trademarks or registered trademarks of their respective companies.

Free Product info enter NWInfoXpress #57 online @ **www.networkworld.com/infoxpress**

Maker software to ease feature changes to net gear

Programmable chips will make it easier for vendors to add functions to net equipment and bring products to market more quickly

BY ROBIN SCHREIER HOHMAN

FRAMINGHAM, MASS. — Maker Communications will soon unveil new software for its chips that could help vendors offer products that run eight times more voice calls over a WAN link.

Maker's new PortMaker software and 4400 chip family, announced last month, are designed for routers, switches and WAN access devices. Together the products support a variety of ATM traffic-management features.

PortMaker will give vendors the flexibility to easily add or change functions and bring end-user products to market more quickly.

Lucent has already signed on to buy the 4400 chips. Other vendors are designing products using Maker chip sets (see graphic).

Multiple personalities

"The chip can take on entirely different personalities depending on the type of software you have loaded on it," says Tom Medrek, vice president of marketing at Maker.

The 4400 chips support the International Telecommunication Union's ATM Adaptation Layer 2 (AAL2) standard, which lets processors run compressed voice using ATM's variable bit rate (VBR) service.

VBR lets voice traffic use only as much bandwidth as it needs, when it needs it. Remaining bandwidth can be used for other services. Most switches today conform to AAL1. AAL1 specifies ATM's constant bit rate, which uses a dedicated connection.

Maker is one of a handful of semiconductor companies creating programmable microprocessors that will make it easier to add features to network devices.

Fabless semi panies such as M processors but to fabricators to tured. Maker through three financing and about $20 million visibility venture c such as Besseme Greylock, Wise P and Norwest V March, the comp go public.

Maker will deb software and NetWorld+Interop The 4400 chi PortMaker are e ship in the this year. ◪

Chip Maker

Maker Communications will ship software for its line of communications processors that support the new ATM Adaptation Layer 2 (AAL2) standard. AAL2 lets ATM support compressed voice over data. Maker's older chips that support AAL1 are shipping in the following products:

- Cisco Catalyst 5000, 6000 and 8500 [illegible] switches
- Cisco 12000 GSR carrier class router
- Ascend CBX 500 edge ATM switch
- Lucent PacketStar carrier class router
- [illegible] Router enterprise switch

Merger of German, Italian carriers puts pressure on Sprint venure

Will Deutsche Telekom/Telecom Italia merger force a reorganization of Sprint's money-losing GlobalOne venture?

BY DAVID ROHDE

One of Sprint's principal business partners, long rumored to be a potential merger partner as well, has decided to merge with someone else instead.

Deutsche Telekom (DT) last week agreed to a merger with Telecom Italia in an $82 billion marriage of two former state-run monopolies.

DT is one of the carriers that owns a stake in Sprint's international network-services company, Global One.

Along with the other partner, France Telecom, DT has reportedly been talking to Sprint about restructuring the Global One venture, which has been a consistent money-loser. DT's merger with Telecom Italia is expected to put even more pressure on Global One to reorganize.

"Some of the issues are very similar to the dissolution of WorldPartners at AT&T," says Lisa Pierce, a telecom analyst with Giga Information Group. WorldPartners, a loose confederation of carriers in various parts of the world, has been all but dropped by AT&T in favor of a tight alliance with British Telecommunications.

Likewise, Global One has been based largely on network-to-network interconnections between the partners rather than a unified switching architecture.

A merger in which DT actually took over Telecom Italia could have strengthened Global One because DT would have dictated the terms, Pierce says.

But the DT/Telecom Italia merger is structured as a merger of equals — each company will get five board seats — and Telecom Italia is said to have little stomach for Global One.

"Now it's as good a possibility that Global One will break apart," Pierce says.

In addition, the DT/Telecom Italia move comes at a time when at least one brokerage house has advised clients that it thinks Sprint may be sold, if not this year, then in 2000 or 2001.

The reports have helped cause a run-up in Sprint's stock price to $107 as of midday Friday (see graphic), and Sprint last week announced a 2-for-1 stock split.

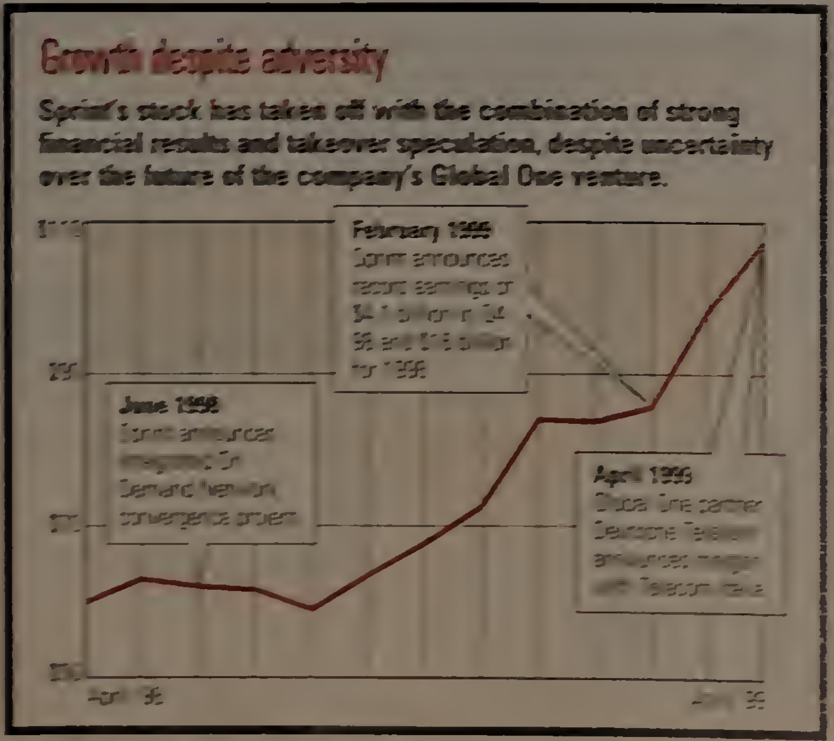
But any Sprint deal, which has been rumored for some time, could likely be delayed now that DT has chosen a different mate. The other likely and widely discussed merger partner for Sprint is a regional Bell operating company, and no RBOC has yet won long-distance authority.

Without such authority, regulators are likely to hold up any pairing with Sprint, the No. 3 U.S. long-distance carrier.

Sprint declined to comment on the DT/Telecom Italia merger and its e One. But France not as shy. Accor ment, the DT/ merger is a "ur and is "incom France Telecon ing partnersh which predates of Global Or A Telecom spok clined to elabor .

In addition, er carriers are likel o oppose the DT leco merger. The mo — which is analogous to I OC mergers in the U.S. bec e they un two dominant arriers fro different geogr hical regio — is expect to undergo tough scru y from the European U on's Competition Comm ion. ◪

> **"Some of the issues a e very similar to the dis olution of WorldPartners t AT&T."**
>
> Lisa Pierce, telecom analyst, Giga Inf



Growth despite adversity

Sprint's stock has taken off with the combination of strong financial results and takeover speculation, despite uncertainty over the future of the company's Global One venture.

Everything You Need To Choose The Best Storage Solution.

Even though we're #1 in storage management and have received virtually every industry award in the category, we're not about to start resting on our laurels.

To the contrary, we're investing more money in R&D than ever before, and it shows.

With a broad range of exciting new features and benefits, ARCserve®*IT*™ remains today's most advanced storage management solution, and now it's available in three editions to address the specific needs of your organization.

ARCserve*IT* **Workgroup Edition** protects your Windows NT LAN. With comprehensive backup for both server and attached clients, online backup of business applications and fast remote disaster recovery, this solution has everything a small environment needs.

Features	Computer Associates ARCserve *IT* v6.61*	Legato NetWorker v5.1	Seagate Backup Exec v7.2
Built-In Unicenter TNG® Framework™ Management	✓		
Java-Based Remote Management	✓	✓	
Free Small Tape and Optical Library Support	✓		
Flexible Directory Level Open File Backup	✓		
Unattended Remote Disaster Recovery	✓		
Dynamic Tape Drive and Library Re-Configuration	✓		
High-Speed Image Backup	✓		
Free RAID Fault Tolerance	✓		
Shared Tape Library Support (ACSLS)	✓	✓	
Fibre Channel SAN Solution for Windows NT and NetWare	✓		✓
Unicenter TNG® Integration	✓	✓	
AS/400 Client Agent	✓		
Complete MVS, OS/390 Storage Solution	✓		
Messaging System Protection			
▪ Microsoft Exchange	✓	✓	✓
▪ Lotus Notes	✓	✓	
▪ GroupWise	✓		

ARCserve*IT* **Advanced Edition** is a scalable solution that offers centralized management for medium to large environments that require multiple platforms and advanced technology support.

ARCserve*IT* **Enterprise Edition** provides comprehensive support for large-scale, more complex and demanding enterprise environments. With cross-platform administration, exceptional performance, and unmatched reliability, ARCserve*IT* Enterprise Edition protects and manages your data from desktop to data center.

New Advanced Edition

But don't let all of the power and advanced functionality fool you. ARCserve*IT* is still as friendly and easy to use as ever. Just what you would expect from the industry leader in systems, network and storage management.

To receive your FREE Trial Copy, visit **www.cai.com/ads/arcserveit** or call **1-877-2 GO FOR IT**. Also available through CA's Open License Program™.

COMPUTER® ASSOCIATES
oftware superior by design.

ARCserve® *IT*™

©998, 1999 Computer Associates International, Inc., Islandia, NY 11788-7000. All product names referenced herein are trademarks of their respective companies. Information based on publicly available information as of 3/12/99. *Features vary by platform and edition, and may require additional options

Free Product info enter NWInfoXpress #55 online @ **www.networkworld.com/infoxpress**

At long last, Nortel unveils Optivity 9.0

BY JIM DUFFY

SANTA CLARA, CALIF. — Nortel Networks last week finally announced a key piece of management software that will ultimately provide users with policy-based network service-level management.

Optivity 9.0, which has been expected since last fall, is intended to manage networks more as systems rather than as individual devices. As a manager of network infrastructures, Optivity 9.0 will provide the underpinnings for policy-oriented management of application service levels, Nortel officials say.

Nortel will announce more details of its plans for Optivity's policy and service-level management directions in the summer and fall, respectively.

Optivity 9.0 provides the basic network management service of earlier versions of Optivity — device discovery, topology mapping and monitoring — but with revisions. Much of Optivity 9.0 has been rewritten in Java, applications have been combined and consolidated, and new packages for virtual private network (VPN) and switch management have been added.

Java lets users access Optivity from any Java-enabled Web browser. That means users no longer need a dedicated Unix workstation or management platform interface from which to manage Nortel devices.

"I'm interested to see Optivity 9.0 because it's going to be platform-independent," says Brian Teepell, senior network engineer at Rights Exchange in Buffalo, N.Y.

"The only reason we're using Sun Domain Manager is to run Optivity."

The two main applications in Optivity 9.0 are InfoCenter and OmniView.

InfoCenter consolidates the functions of three previously separate Optivity applications. InfoCenter is the network administrator's central console and provides a tabular or graphical view of an enterprise network. From this console, an administrator can launch applications and customize network views by end node, hub, switch, segment, subnet and alarm severity.

OmniView consolidates five previously separate applications. OmniView gathers network statistics in real time, allowing users to drill down into switches and routers to determine virtual LAN activity and CPU, buffer and memory utilization.

For VPN management, Nortel rolled out Optivity VPN Manager 1.0, which allows users to configure Nortel Contivity VPN switches.

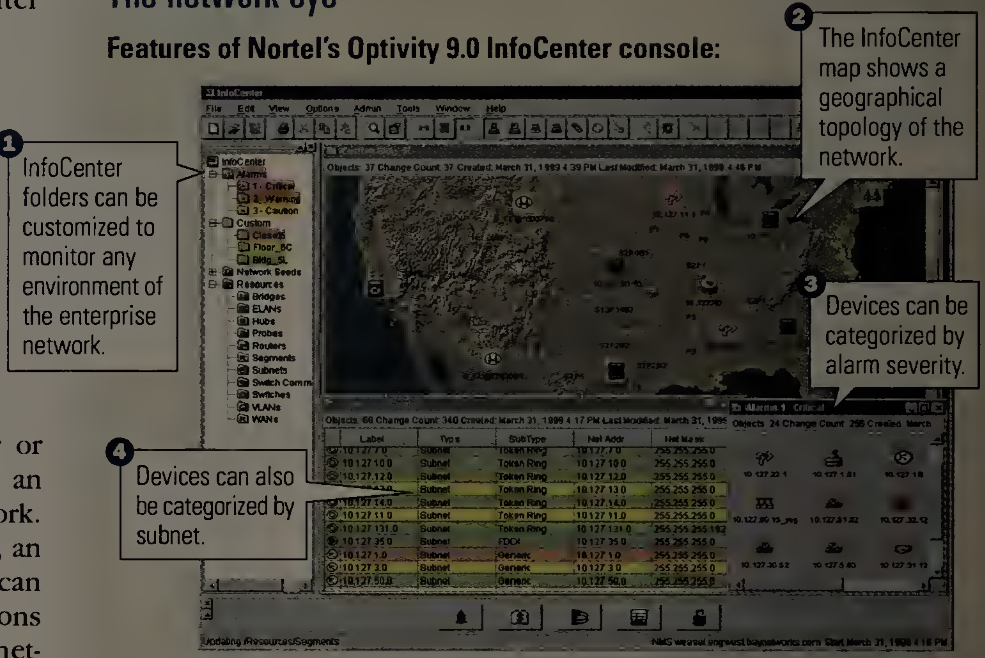
For switch management, Nortel unveiled a version of its Web Pocket Probe that supports the emerging Switch Monitoring Management Information Base.

Optivity 9.0 costs $9,995 and will be available in June. VPN Manager costs $4,995 and is available now. The Web Pocket Probe is priced from $1,495 to $1,995 and is available now.

Nortel: (408) 988-2400

The network eye

Features of Nortel's Optivity 9.0 InfoCenter console:



① InfoCenter folders can be customized to monitor any environment of the enterprise network.

② The InfoCenter map shows a geographical topology of the network.

③ Devices can be categorized by alarm severity.

④ Devices can also be categorized by subnet.

Bhardwaj,

continued from page 7

Layer 3 switches. ControlNet developed the 400M bit/sec version as a low-cost alternative to Gigabit Ethernet, which the company figured would be hampered by its high cost. Instead, Gigabit Ethernet is taking off.

"Failure is a reality of life in this business," Bhardwaj says, adding that the strong ideas survive and turn into products.

This practical approach to development is Bhardwaj's strength, says Larry Blair, who marketed Kalpana and now is vice president of marketing at Redback Networks. "He's an incredibly pragmatic thinker, as well as a visionary person," Blair says. "There are so many other people who want to build technology for technology's sake."

At a time when many in the industry were looking to ATM and higher-speed Ethernet to solve network congestion problems, Bhardwaj increased throughput by splitting LANs into segments on switches, founded a company to support the concept, and named the company after his wife, Kalpana.

Antara, a start-up named for Bhardwaj's oldest daughter, in February started shipping a product that manufacturers can use to test new network products.

Antara uses application-specific integrated circuits developed by ControlNet's engineers to emulate network nodes. The product, called Port Authority, generates traffic that can include partial packets and error packets, mimicking a real environment, says Chuck Kolstad, president and CEO of Antara.

The product debuting next month, Port Authority/IT, uses a fiber tap and a repeater to pick up light signals traveling over a fiber-optic line and send them out again at full strength. This capability means the probe doesn't disturb the light signals or shorten the distance they can travel.

Combined with Compuware's EcoScope, Port Authority/IT addresses the difficulty of parsing application information from the large amounts of data that can travel over a gigabit link. Getting data from Remote Monitoring (RMON) agents embedded in switches is difficult and usually doesn't extend to RMON 2 application information, according to Compuware executives.

Up to four EcoScope analysis applications, each running on different servers, can be applied to a single Gigabit Ethernet link, through the Antara product.

Port Authority/IT will ship in June and is priced at $7,995. EcoScope 4.0 will also ship in June with pricing starting at $36,500.

Antara: (408) 341-1400; Compuware: (800) 521-9353

Hey readers!

Try out our new online

Readers Favorites & Greatest Survey

"We have met the enemy, and he is us." — **Pogo**

Don't miss your chance to stand up and be counted on 50 of perhaps the most consequential issues of this, or any other, millennium.

We'll be online with five questions per week for the next nine weeks. Answer just five at a time, or complete the whole survey at once. On July 26, we'll publish the results in our You Issue, and you'll be able to see how your answers compare with those of fellow *Network World* readers.

Get your corporate work out of the way early today, and get down to some decent Web interactivity at **www.nwfusion.com, DocFinder: 2524.**

Here are this week's questions. Enjoy.

1. Favorite sport you participate in (bowling is an acceptable answer)
2. Favorite age you've been (so far)
3. Most interesting decade of the 20th century
4. Favorite comic strip of all time
5. Coke or Pepsi?

Infrastructure

TCP/IP, LAN/WAN Switches, Routers, Hubs, Access Devices, Clients, Servers, Operating Systems, VPNs, Networked Storage

Briefs

Data General later this spring will roll out Aviion Windows NT servers based on Intel's eight-processor Profusion SMP architecture. Data General says customers running databases and enterprise resource planning applications on its servers have expressed interest in Profusion. The company claims servers based on the technology will perform about 50% better than today's most powerful four-way servers.

Data General: (508) 898-5000

Chaparral Technologies this week will roll out a router for use in Unix or Windows NT storage-area networks. The FS1310 Intelligent Storage Router links Ultra2 SCSI storage devices, such as disks, tapes or optical storage, to a Fibre Channel network. The router is designed for server clustering, remote data vaulting or backup and restore applications. The router operates at faster than 90M byte/sec and supports distances up to 12 meters. It has one Fibre Channel and three Ultra2 SCSI channels. Each channel can connect to up to 15 devices.

Chaparral also offers the router with Legato's Celestra software built in. Celestra lets users back up data across a network without server intervention.

The FS1310 costs about $8,500.

Chaparral: (303) 684-3200

Transition Networks in Minneapolis has introduced its first media converter for transferring data from twisted-pair copper to fiber-optic lines on High-Speed Token Ring networks. Transition says this can increase the range of a net segment from 100 meters to as much as 20 kilometers.

The converter is shipping now, with prices of $425 for multimode support and $945 for single-mode.

Transition: (800) 526-9267

Old switches, routers pose Y2K threat

Internetwork vendors are not testing much of their gear that is more than two years old.

BY JIM DUFFY

Last in a four-part series.

Users of routers or switches dating back two years or more had better take note: Your network will likely not make the Y2K grade.

The leading internetwork vendors — Cabletron, Cisco, Nortel Networks' Bay Networks unit and 3Com — are not even considering testing some pre-1997 products for Year 2000 compliance. Other products have been tested and passed or will require a software upgrade to bring them into compliance.

The Y2K problem with routers and switches lies in the onboard real-time clock and operating system software. Many clocks and operating systems register dates using two digits. They cannot distinguish between the two zeros at the end of 1900 and 2000, so when the clock rolls over, devices that rely on that date information could malfunction.

Avoiding network meltdown

Tips for making your net Y2K-compliant:

- For all network devices, check the purchase date.
- For gear purchased before 1997 that is still available, apply software or microcode patches.
- For older gear that's obsolete, take advantage of vendor rebate and trade in programs.

Networked applications that rely on time stamping and other scheduled processes can be disrupted if the network devices between clients and servers cannot register the correct date. Network management applications that perform error reporting and log device uptime may also provide imprecise data on a network's status.

Indeed, the Y2K problem is especially critical for networks because it could pose a security risk. Network devices that cannot read the correct date can allow intrusive packets into the network, further disrupting business operations.

In a database managed by Infoliant that tracks the Y2K status of key routing and switching products, numerous Cisco product scores are listed alongside the phrase "Vendor Will Not Test." These products include AGS and AGS+ routers, 3000 series routers, specific releases of the Catalyst 5500 LAN switch and CiscoWorks management software, as well as Kalpana EtherSwitches.

Cisco says it will not test products that it will no longer be selling or supporting next year.

Rival Nortel Networks will not test any product for Y2K compliance built or sold before Jan. 1, 1997, according to Infoliant and the Nortel Web site. Such products include Ethernet transceivers and host modules, 16-port ATM OC-3 switches, and LattisSwitch models 28115 and 28104 Ethernet and Fast Ethernet switches. Also on the list are EtherCell Ethernet-to-ATM switches and several models of the Access Node, Access Stack Node and Access Node Hub routers.

3Com and Cabletron have similar policies.

Cabletron has discontinued several products over the past two years — from some Ethernet, token-ring and FDDI switching and routing modules to SmartSwitch 9000 processors. The company is offering replacements for some

See **Y2K**, page 26

Windows terminal built for speed

BY JOHN COX

SAN JOSE — TeleVideo has begun shipping what it claims is the fastest Windows-based terminal on the market.

The new TeleClient (TC) 7000 uses a 233- or 300-MHz Cyrix Media GXm chip, either of which will enable a terminal to handle several application sessions at once. TeleVideo executives say the 233-MHz chip enables a terminal to display graphical screens 30% to 40% faster than competing processors can.

The chips being used by TeleVideo are apparently the fastest ones now in use for terminals, according to Eileen O'Brien, an analyst who covers thin clients for International Data Corp., a market research firm in Framingham, Mass. But she says some vendors insist that once a chip gets over about 200 MHz, the difference in screen display speed is hardly visible to the naked eye.

TeleVideo's TC 7000 terminal works with multiuser NT nets.

The TC 7000 is a true Windows-based terminal — it runs Microsoft's Windows CE operating system and uses the Remote Desktop Protocol to interact with a multiuser NT server, which handles application processing. Optionally, the terminal supports Citrix Systems' Independent Computing Architecture protocol to connect to Microsoft's NT Server 4.0 Terminal Server Edition or to Citrix WinFrame servers.

The terminal's software is stored on 8M bytes of flash memory, which can be reprogrammed at the terminal or from a remote server. The terminal, like several other brands, has an array of terminal emulators built into it, so it can also connect to Unix servers and mainframes.

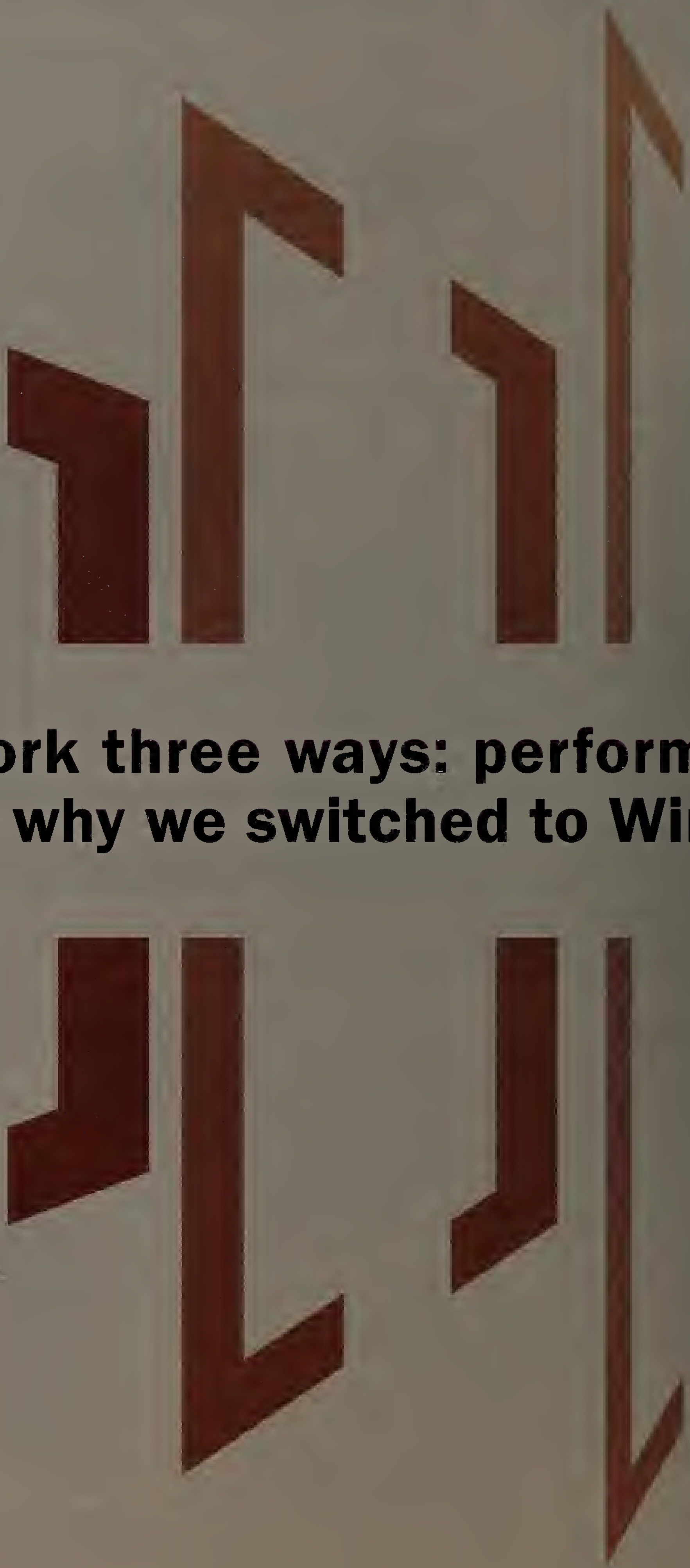
TeleVideo is selling the unit as a compact box into which an existing monitor can be plugged.

Because faster chips run hotter, TeleVideo has designed a special heat-dissipation system without a fan, says Kevin Yang, a company vice president. This way, he says, the terminal has no moving parts.

The TC 7000 is available now, with a suggested list price of about $600, which is more expensive than the price of some other terminals.

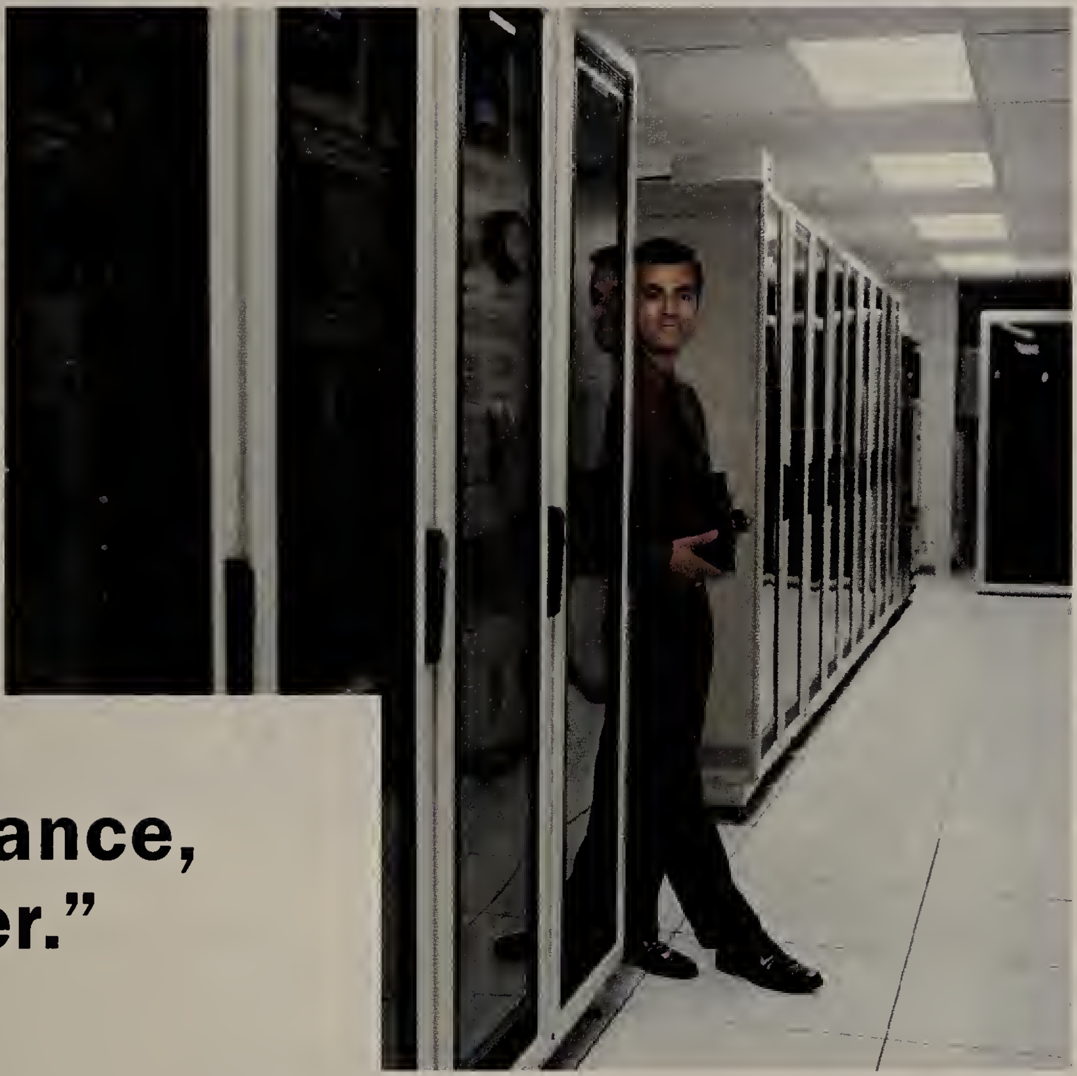
TeleVideo also offers two models with the circuitry built into either a 15- or 17-inch TeleVideo monitor, instead of packed into a separate box. Both run the 233-MHz Cyrix chip. These models have suggested list prices of $849 and $969, respectively.

TeleVideo: (800) 835-3228



“We judge our network three ways: performance,
performance. That’s why we switched to Windows

©1999 Microsoft Corporation. All rights reserved. Microsoft, the Windows logo and Windows NT are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Other product and company names mentioned herein may be the trademarks of their respective owners. Microsoft Corporation is not owned by or affiliated with Countrywide Home Loans, Inc. Microsoft Corporation is solely responsible for the operation of its products and the quality of its services.



performance,
NT Server.”

“We used to run NetWare and OS/2, but I thought we could get better performance using one platform. So we moved to Microsoft® Windows NT® Server. Obviously, it was a big decision to switch, but this network upgrade has really worked out for us. Our customers get faster service. Our loan consultants can close more loans. And the company has a competitive advantage. Everybody wins.”

Jerry Gross, CIO
Countrywide Home Loans, Inc.

Windows NT®
Server 4.0

www.microsoft.com/go/CaseStudy/Performance

Microsoft®
Where do you want to go today?®

IN-SITE: *Lessons from Leading Users*

New ATM network that ensures QoS is just what the doctor ordered

Hospital's $11 million installation to assist with patient care, teaching and administration.

BY JIM DUFFY

A Chicago-based hospital has prescribed itself an ATM network designed to handle a new breed of multimedia applications, including one that will enable patients to educate themselves about their medical conditions.

Northwestern Memorial Hospital (NMH) is installing the $11 million network in a new 22-story, 2 million square-foot building that spans a full city block.

The 4,000-user network will be the cornerstone of NMH's radiology, pharmacy and administrative operations, as well as patient and caregiver educational services.

NMH considered Gigabit Ethernet for its new network, but the hospital chose ATM because of the technology's maturity and ability to ensure that important applications receive the necessary quality of service.

"We're running everything from clinical data to e-mail," says Paul Barry, NMH's director of networking and communications. "Clinical data is important to us. Patient care drives the entire organization."

The new network will be 80 times faster than the legacy FDDI and shared 10M bit/sec Ethernet net it will eventually replace, Barry says. The ATM network will also be more fault-tolerant. But most importantly, it will support the new breed of multimedia applications NMH wants to offer its patients and caregivers.

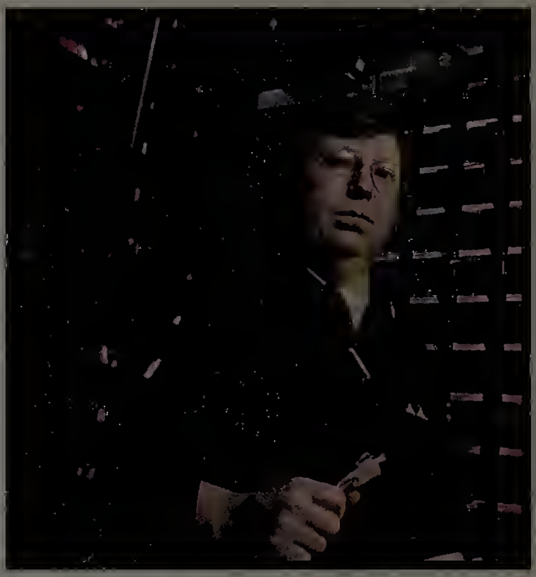
NMH is looking to provide a network-based Health Learning Center, which will be a library of electronic content that patients can use to do research on their medical conditions. Nurses and technicians will also be able to use the library to brush up on ways to treat these conditions.

"We think there's a big opportunity to run multicast video," Barry says. With multicast video, caregivers will be able to go into a nursing conference room and select a channel on a PC that will provide the latest information on anything that is clinical in nature.

NMH will also use the network for training medical students via multimedia applications. Students will view live surgeries and other operating room procedures directly from their desktops.

For radiology, the new network will enable NMH to use GE Medical's Picture Archiving and Communication System, a filmless radiological imaging system that will speed the evaluation of X-rays, magnetic resonance imaging and CAT scans. Using a standard Web browser, a radiologist will view the image on a monitor, then quickly send a diagnosis to a physician.

Radiologists also will be able to access the hospital's network from their homes to evaluate medical images. Eventually, physicians will use the network to instantly share cardiograms, ultrasound tests and a range of results from other procedures.



NMH's Paul Barry says the hospital chose ATM over Gigabit Ethernet because ATM can ensure that applications will receive the necessary quality of service.

ALAN KLEHR/MPG

Built on ATM and Layer 3

The network, which will support about 600 physicians, is being built on 3Com ATM and Layer 3 switches. The network will include 19 of 3Com's CoreBuilder 9000 backbone switches and 122 CoreBuilder 7000HD switches, which will provide high-speed links to desktops and workstations for 2,500 users. The health care institution's net will also feature two CoreBuilder 3500 Layer 3 switches for routing among LANs and providing connectivity to NMH's legacy network in its older buildings. The switches will occupy 111 wiring closets in the new NMH building, Barry says.

The CoreBuilder 9000s will anchor a mesh of 16 622M bit/sec OC-12 fiber links. Redundant OC-3s will connect the 7000HDs to the 9000s at 155M bit/sec. One OC-3 will run straight down the building riser to a 9000 in the building's main communications closet; the other will run down an alternate riser from another wiring closet.

OC-3 pipes will also connect the 3500s to the 9000s. Desktops will be connected via Fast Ethernet to the 7000HDs in wiring closets.

NMH's legacy network is a 100M bit/sec FDDI ring with shared 10M bit/sec hubs. Cabletron and Cisco were the primary suppliers for that network, Barry says. A Cisco router will connect the legacy net to the new 3Com network at 100M bit/sec.

The legacy network is being maintained for transitional purposes while NMH moves people into the new building and brings up the new network. The new building is scheduled to open next month.

"We're trying to keep everything status quo as we move in, so we haven't been really aggressive," Barry says. "We don't want to make too many changes at one time."

The legacy network includes 90 Novell servers, 15 to 18 Windows NT servers, and 12 mid-range systems, including IBM AS/400s and RS/6000s, Compaq/Digital 8400 clusters and HP servers. All of the servers run specific departmental medical applications, such as those for the pharmacy, dietary and radiology departments.

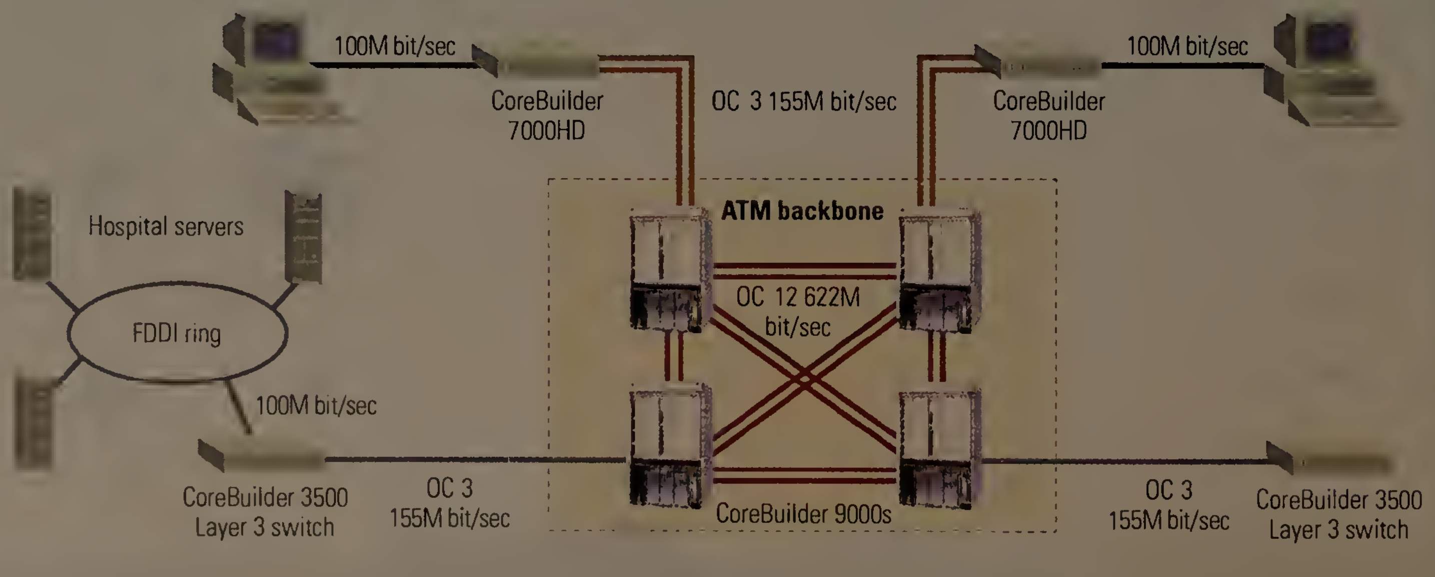
NMH will gradually migrate those servers onto the new network and configure them into eight emulated LANs. Emulated LANs are frame-based Ethernet and token-ring networks connected over an ATM backbone.

3Com bested Cisco for the NMH contract, Barry says.

"All things being equal, price was the winner," he says. "We got a really good deal." ◪

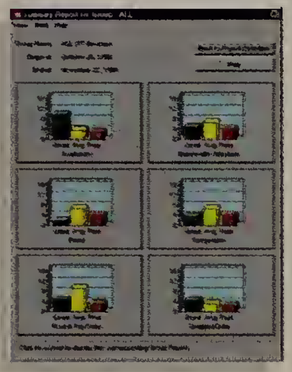
Healthy redundancy

Northwestern Memorial Hospital's (NMH) new ATM network features a meshed OC-12 backbone with redundant OC-3 uplinks to wiring closets. 3Com CoreBuilder 3500 switches handle Layer 3 switching and routing among LANs and provide a 100M bit/sec link to NMH's legacy FDDI network.



What You Know About Your Frame Relay SLA Performance.

SPECIAL OFFER—FrameVision Starter Kit
www.kentrox.com/starterkitca

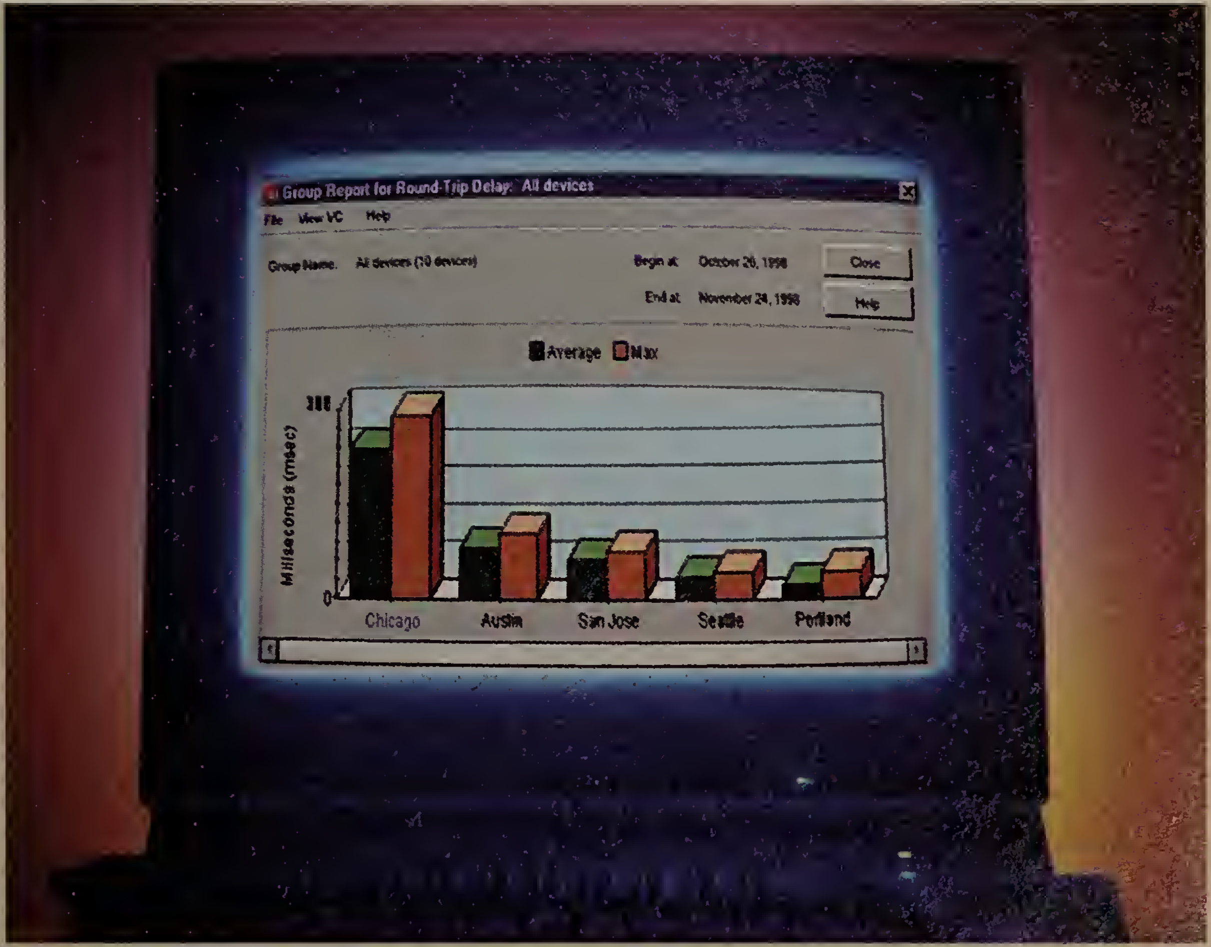


FrameVision™ Frame Relay SLA monitoring from ADC Kentrox takes the guesswork out of managing your network performance. And with the FrameVision Starter Kit, you can take your first look at what's going on with your WAN traffic—*risk-free!*

Order the FrameVision Starter Kit by July 31, 1999, and you can start to monitor your Frame Relay SLA. Try this special offer, priced at $2,295—and save an additional $150 if you order by May 31, 1999.

For more information call 1-800-733-5511 or visit www.kentrox.com/starterkitca. Or call your ADC Kentrox reseller today to place an order (Model #72601).

It's the risk-free way to give yourself the power and information to make smart network decisions.



Group Report for Round-Trip Delay: All devices

Group Name: All devices (10 devices)

Begin at: October 26, 1998

End at: November 24, 1998

What You Should Know About Your Frame Relay SLA Performance.

ADC Kentrox®
Redefining Network Access™

Free Product info enter NWInfoXpress #52 online @ **www.networkworld.com/infoxpress**

sure
we're fast, dependable and responsive.
PRODUCT OF THE YEAR 1998
DataComm MAGAZINE TESTER'S CHOICE
25 DataComm MAGAZINE TOP 25 HOT STARTUPS
NETWORK COMPUTING FLYING COLORS
NETWORK COMPUTING EDITOR'S CHOICE
TOLLY Up to Spec
COMPUTERWORLD HOT 100 COMPANY
Independently tested NETWORKS AS ADVERTISED MIER COMM. INC.
BCR Best in Test
THE BEST OF LANTIMES

Stackable Switches & Switching Routers

FastIron Workgroup & Backbone Switches
NetIron Switching Router
TurboIron/8 Switch & Switching Router

ServerIron Server Load Balancing Switch

FastIron II Wiring Closet Switch

BigIron 4000 Switch & Switching Router

BigIron 8000 Switch & Switching Router

Whenever top-tier ISPs like AOL®, Yahoo!® and MindSpring® cry out for maximum speed, we heed their call. When enterprises like First Union National Bank, LTV Steel and Carnival® Cruise Lines grasp for reliability, we leap to the rescue. And when organizations like the University of Southern California and the National Institutes of Health search the world for price and performance, we arrive just in time.

(but we also have special powers.)

We're Foundry Networks. And we've got powers no one else can match. For starters, we're the only vendor to offer super-fast 10/100 and Gigabit Ethernet switches for Layers 2, 3, and 4-7—all totally integrated. Plus Packet Over SONET WAN links. That's product breadth from the network edge to its core.

Then there's our super feature set. Integrated multi-protocol wire-speed routing and application-aware Layer 4-7 switching. Plus 64 port Gigabit Ethernet density at up to 96 Mpps for maximum investment protection and flexibility.

Yes, we've won multiple awards for product and corporate excellence, but we're not in this business for the praise. We're in it to give our customers **IronClad Network Performance**. Does that make us superheroes? We don't know. But our customers might.

Visit www.foundrynetworks.com/turboman for a hot deal on our hot products. Or call, 1-888-TURBOLAN (887-2652).

FOUNDRY
NETWORKS

phone: 408.530.3300 visit: www.foundrynetworks.com email: info@foundrynet.com

Free Product info enter NWInfoXpress #59 online @ **www.networkworld.com/infoxpress**

Y2K,
continued from page 19

of these products. Cabletron also is not testing several third-party products, such as Cisco router modules and SNA channel-attachment cards. The company is referring Y2K queries about some of these products to the manufacturers.

3Com has discontinued all of its David Systems — aka ONSemble — products and is not testing them for Y2K compliance. The company has discontinued specific models within other product lines, including the LANplex switch line, and will not test these products, according to the Infoliant database and 3Com's Web site.

Some products, such as NetBuilder II routers and SuperStack II OC-3c ATM modules, are "pending evaluation," according to the Infoliant database.

More recent products, meanwhile, may require software or microcode patches to bring them into compliance. For instance, users of Cisco's Catalyst 1100 LAN switches running software releases prior to Version 3.6 will have to upgrade to this version in order to come into Y2K compliance. Similarly, users of Nortel routers running BayRS software Versions 10.X need to upgrade to Version 11.03 Rev5 or 12.0 Rev2 for Y2K compliance.

Versions of Cabletron's MMAC-Plus Device Management Module prior to 5.0 need to be upgraded to that version; and 3Com's AccessBuilder 7000 BRI Bridge/Router module needs to be upgraded to Version 5.03I2 or later.

Users need to peruse vendors' Y2K compliance Web sites, check the Infoliant database or contact vendors to determine if such patches are needed.

Users may also be eligible for rebates and trade-ins for their unusable equipment. Fortunately for users, the leading internetwork vendors appear to be proactive in their Y2K compliance and upgrade efforts.

Nortel is offering customers a trade-in incentive of up to $700 per port for noncompliant products, depending on the product family. This rebate also applies to Nortel's Bay Networks equipment acquired by customers from other vendors and to equipment obtained by Bay through its various acquisitions.

Cisco has a Technology Migration Program whereby users can exchange older gear for credit toward upgrades. Cisco says the amount of credit depends on the age, feature set and value of the older products, compared with the value of the newer gear.

Cabletron has a trade-up program for discontinued products that offers users discounts based on volume, the product family and age of the older gear. Cabletron stresses, though, that none of its products has become obsolete as a result of Y2K issues; products were discontinued based on functionality and price/performance, says Dave Cleveland, director of services marketing for Cabletron.

3Com says it, too, has a product trade-in program, specifics of which vary by product. ◪

WHAT DOES QMS MEAN TO YOU?

Spooling, loading, queuing. No matter what you call it, waiting for documents to print can bring your productivity to a halt. But award-winning QMS® laser printers solve your network traffic problems with print speeds of up to 40 pages per minute. Featuring web-based printer management, job spooling and serverless printing, QMS print systems make the most of your network bandwidth and your time. So your team can make the most of the work day.

Network Laser Printers Starting As Low As
$1299*

QMS®
Laser printers that enhance your vision.

1-800-392-6247
www.qms.com

*All prices in U.S. dollars. ©1999 QMS, Inc. QMS, the QMS logo, and magicolor are registered trademarks of QMS, Inc. All other trademarks or registered trademarks are the property of their respective manufacturers. G.S.A. contracts are available. 3/99

NWInfoXpress #62 @ www.networkworld.com/infoxpress

More Online

- Earlier articles from our series on preparing for Y2K.
- A whole page of Y2K resources.

FIND IT DocFinder 2624 ON FUSION
www.nwfusion.com

THE BOYS IN ACCOUNTING ARE WATCHING DEBBIE IN ACTION. YOU'RE WATCHING A LAWSUIT IN ACTION.

INTERNET ABUSE DOES MORE THAN WASTE YOUR COMPANY'S BANDWIDTH AND CAUSE NETWORK DELAYS. It can open you up to a lawsuit. The CommandView product family from Elron Software saves your company—in more ways than one. For instance, CommandView products can monitor, report, and block inappropriate material from the Web, e-mail, and newsgroups. So you can identify network abuse and enforce Acceptable Usage Policies. They also let you prioritize network traffic, so important applications always get through. And unwanted visitors and offensive content stay out. To learn more about Elron's best-of-breed CommandView products—or to order your free interactive CD—visit www.elronsw.com/cddemo, or call 1-800-767-6683. And watch us in action.

ELRON SOFTWARE

MAXIMIZING INTERNET PRODUCTIVITY

Elron Software Inc. · One Cambridge Center · Cambridge, MA 02142 · Tel: 1-800-767-6683 · www.elronsw.com/cddemo

'NET INSIDER

A waste of good brainpower

I've noticed a disturbing trend: the emergence of papers by scholars who think they know more about how the Internet works than they actually do.

For example, *The Virginia Journal of Law and Technology* just published an article by Rob Frieden titled "Without Public Peer: The Potential Regulatory and Universal Service Consequences of Internet Balkanization" (http://vjolt.student.virginia.edu/graphics/vol3/home_art8.html). As far as I can tell, Professor Frieden's assumptions of Internet structure are wrong and negatively impact the usefulness of his conclusions.

The article looks at an important issue, the application of the universal service fund (USF) on the Internet.

Reality sometimes hurts. For example, goods and services don't cost the same everywhere. Electric power is more expensive in Boston than it is in Seattle. Gasoline is more expensive in Hawaii than it is in Texas. For most people, these are facts of life. We evaluate the various features of living someplace and decide where to live based on our priorities.

Cambridge, Mass., may not be the best place to live if I wanted to raise emus, but it is quite convenient because I work at Harvard.

This same type of disparity used to be present in telephone service because of the higher cost of wiring up customers in areas of low population density.

But since the establishment of the USF, costs to the consumer have been artificially leveled by taxing telephone customers in low-cost areas and using the funds to subsidize customers in high-cost areas.

Enter the Internet. The movement of telephone and telephonelike services to the 'Net means that regulators are starting to ask if 'Net customers should also be charged the USF tax. Some people are asking if Internet costs should also be artificially leveled using the USF because the 'Net is becoming so important.

Scott Bradner

There are real questions, and we will need answers soon. Scholarly papers on these topics are beginning to appear — unfortunately many of them, such as Frieden's, demonstrate an impressive lack of understanding of the current Internet world and thus waste the brainpower of their authors.

The misunderstandings range from not knowing that most ISPs have always been paying customers of other ISPs to not understanding how peering points such as MAE-East are run. Based on these flawed understandings, Frieden finds that the interconnection structure of the Internet is changing for the worse and implies that something should be done, such as mandating requirements for ISPs to interconnect. He then discusses some Federal Communications Commission rulings and finishes the article by arguing that ISPs should be required to pay into the USF, without actually saying so.

This is clearly a thoughtful article. Unfortunately it's not based on reality. When people such as Frieden are able to get a better understanding of the real world, these articles will become relevant, and that will be very useful.

Disclaimer: Harvard thinks it deals with reality, as do I, and the above is a reflection of my understanding.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

On the net without a net?

You need a firewall, an affordable, easy to use solution that has rock-solid **security**, supports all your Internet needs, and that you can **trust** to stay with you as the Internet grows and changes.

BorderWare has been providing this to thousands of users since the Internet explosion began.

Version 6 introduces new advanced features, better performance and **lower cost of ownership.**

Find out how BorderWare can be your safety net today. **Visit www.borderware.com**

BORDERWARE Technologies Inc.

90 Burnhamthorpe Rd. West, Suite 1402, Mississauga, Ontario, Canada, L5B 3C3
Toll Free 1-877-814-7900

Free Product info enter NWInfoXpress #53 online @ **www.networkworld.com/infoxpress**

Executive Profiles

Dennis (Denny) D. Matteucci
Chief Executive Officer
Cable & Wireless USA
(800) 969-9998
www.cwusa.com

Dennis (Denny) D. Matteucci was named Chief Executive Officer of Cable & Wireless USA on November 30, 1998. He was most recently President, Interactive Services — Worldwide with CompuServe, which he joined in April 1996. Denny brings to Cable & Wireless USA strategic sales, marketing communications and information technology expertise. His career spans more than 35 years with leading companies in the industry including IBM, Ameritech and Northern Telecom.

Jerry Ungerman
Executive Vice President
Check Point Software Technologies
(650) 628-2000
www.checkpoint.com

Check Point Software is the worldwide leader in secure enterprise networking solutions. The company's architecture includes network security, traffic control and IP address management. Check Point solutions enable customers to implement centralized policy-based management with enterprise-wide distributed deployment. Via the OPSEC Alliance, Check Point's solutions seamlessly integrate with products from almost 200 industry partners.

Grant Asplund
Product Evangelist
Check Point Meta IP
(206) 674-3700
www.checkpoint.com

Check Point's Meta IP is an automated solution for managing IP addressing and naming across both single-site and large, multi-site networks. The Meta IP product, which includes an enterprise management service, standards-based IP network services (Dynamic DNS, DHCP and RADIUS), and an open and distributed LDAP data store, provides superior control and reliability when compared to the "free DHCP" bundled with server packages. The Meta IP Address Management solution offers cross-platform compatibility (including Windows NT, Solaris, Linux, HP-UX, AIX, and Novell), multi-level fault-tolerance, complete auditing / reporting, and transparent single sign-on through Meta IP's unique User-to-Address Mapping technology that associates IP addresses with login names.

Compatible Systems
the **VIRTUAL** leader

Matt McConnell
CEO and President
Compatible Systems Corporation
(800) 356-0283
www.compatible.com

Compatible Systems Corporation is the industry leader in hardware-based VPN solutions for remote client and site-to-site networking. The company has more than 10 years of network product design experience and has worked with VPN technologies since 1991. Compatible Systems has strong customer, reseller and ISP relationships and has installed equipment in thousands of networks worldwide.

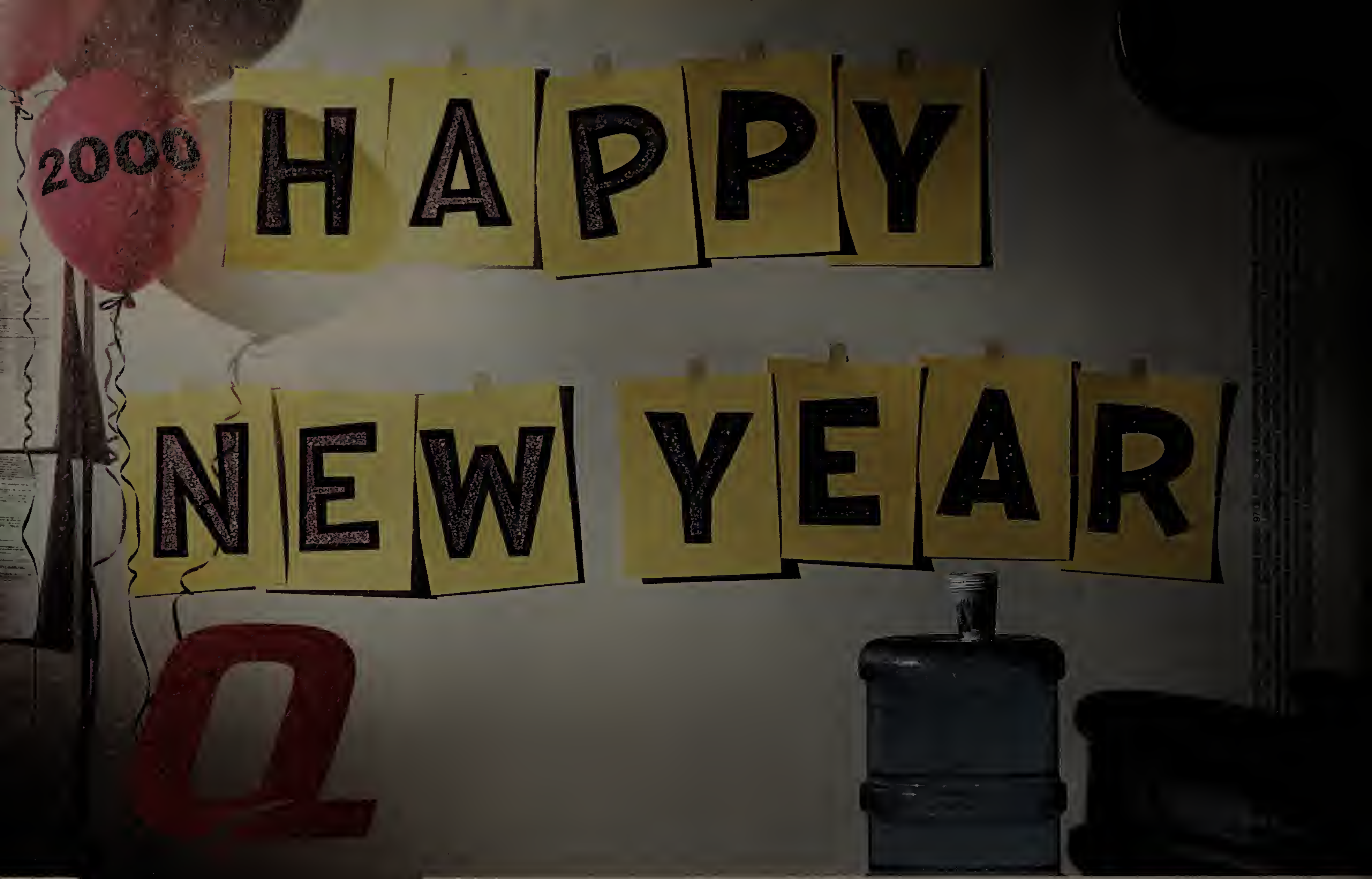
Yogesh Gupta
Sr. Vice President Product Strategy
Computer Associates
(516) 342-5224
www.cai.com

Computer Associates International, Inc. (NYSE: CA), the world leader in mission-critical business computing, provides software, support and integration services in more than 100 countries around the world. CA has more than 13,000 employees and had revenue of $5.1 billion in calendar year 1998. For more information about CA, please call 516-342-5224 or email info@cai.com CA's world wide web address is www.cai.com.

Michael Doyle
President
Eastern Research, Inc.
(800) 337-4374
www.erinc.com

As networks turn inexorably toward ATM, circuit switched networks continue to expand in parallel. Network service providers will face the challenge of bridging these technologies in the new millennium. Eastern Research, whose narrow-band crossconnect technologies anchor the current networks of many service providers, will augment these capabilities to provide cell access to circuit switched networks.

All efforts have been made to make this listing as complete and accurate as possible. *Network World* is not liable for errors or omissions.



Whose warranty says you'll have one?

Ours. Every new Compaq Deskpro® is warranted to be Y2K hardware compliant[1] and the time to celebrate that is right now. Experts say to be Y2K-ready well in advance, and PC replacement (especially at new Compaq Deskpro prices) is the easiest thing to put behind you. Of course, what's ahead matters, too. Every Compaq Deskpro is optimized for the enterprise—not just powerful but manageable (pre-loaded with industry-leading asset management tools), compatible, serviceable and famously reliable. For the reseller nearest you call 1-800-AT-COMPAQ. Visit us at www.compaq.com/happy2K.

intel inside pentium®II

COMPAQ DESKPRO EN AT $1,299[2] INCLUDING MONITOR

- Pentium® II processor 350 MHz
- 4.3 GB SMART II Ultra ATA Hard Drive[3]
- 32 MB RAM
- ATI RAGE PRO TURBO AGP Graphics
- V500 15" (13.8" viewable) monitor
- 3-year limited warranty[1]

COMPAQ Better answers.℠

Carriers & ISPs

The Internet, Extranets, Interexchange and Local Carriers, Wireless, Regulatory Affairs

Briefs

Sprint plans to beef up its Integrated On-Demand Network (ION) access options with the $103 million acquisition of **Peoples Choice TV (PCTV),** a wireless broadband service provider. PCTV can reach more than 7.8 million households nationwide with its wireless Microwave Multipoint Distribution System. Sprint plans to use PCTV's existing wireless infrastructure and deploy asymmetrical digital subscriber line services in 35 markets.

Sprint's ION services are available to a handful of customers today. ION is expected to be widely available by the fourth quarter.

Sprint: (800) 413-8365

Bell Atlantic last week said it would offer disaster recovery services in partnership with recovery specialists at Comdisco and Lucent. Bell Atlantic's Comm-Guard service will include disaster recovery and contingency planning for mainframe and desktop computer operations. The service will also include planning for personnel, communication and emergency procedures, as well as the security that will be needed in the event of a disaster.

Bell Atlantic: (800) 846-1200

The telecom market may be in the throes of deregulation, but the regulator is still firmly in business. The **Federal Communications Commission** is proposing a record Fiscal Year 2000 budget of $230.9 million, up $38.9 million from this year. Most of the agency's budget is collected in fees from carriers, radio and TV stations, and the like, rather than from taxpayers. FCC Chairman William Kennard also asked Congress for "buyout authority" to offer some of the FCC's 1,930 employees early retirement packages.

Area code problems take backseat to Y2K

Carriers ask FCC not to implement a new area code assignment system until 2000.

BY DAVID ROHDE

WASHINGTON, D.C. — The telecom industry is planning to start fixing the area code crunch — just as soon as the Year 2000 crisis is over.

Network World has learned that regional Bell operating companies and other large local carriers are begging the Federal Communications Commission not to impose a new system for creating area codes until next year at the earliest.

The FCC is considering mandating such a new system because area codes keep multiplying, causing users to continually reprogram voice and data dialing scripts (*NW,* April 19, page 6).

Experts say new area codes are required not because of user demand for phone numbers — the usual explanation given by carriers — but because of a flaw in telephony switching systems. Those systems only examine the area code and the following three digits, or exchange, to determine which carrier terminates the call. As a result, each competitive local exchange carrier (CLEC) that enters a local calling area must take an entire exchange — a block of 10,000 phone numbers — even if it has only a handful of customers.

The FCC is considering whether to mandate number pooling, a system in which several carriers share the available numbers in an exchange. But local carriers say that would require extensive modifications to their switch software at the very time they are working to make that same software Y2K compliant.

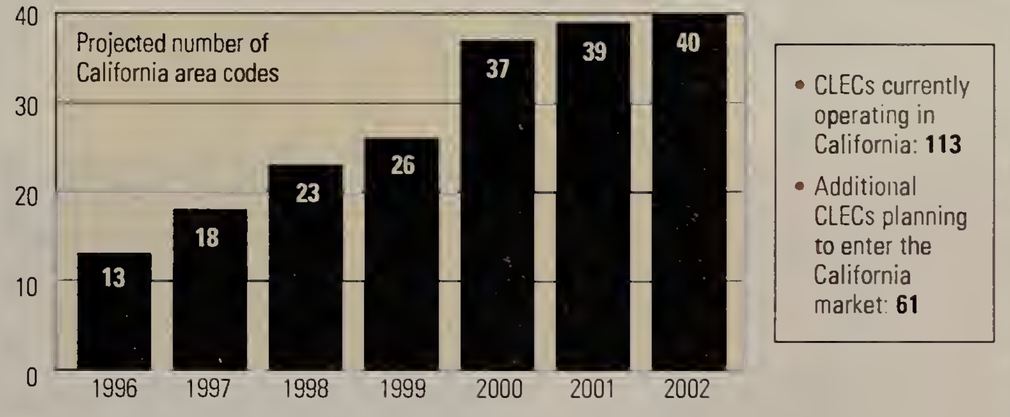
Bell Atlantic and Ameritech, along with several CLECs, have conducted voluntary trials of number pooling in certain area codes in Illinois and New York state. But long-distance carrier and CLEC officials say they are reluctant to engage in any more testing until the FCC produces national standards. "What we need to go forward is an FCC order," says Peter Guggina, MCI WorldCom's director of technical standards management.

"We need one way of doing [number pooling] across the entire country," says Chris Kennedy, AT&T's manager of number policy and practices.

Meanwhile, another telco practice is making the problem even worse, observers say. Many incumbent local carriers force competitors to use multiple 10,000-number blocks to obtain full coverage of an area code. That's because carriers break down area codes into small zones called rate centers so they can measure the precise mileage of a call.

Eastern Massachusetts, which has four area codes, has 203 rate centers, notes Lee Selwyn, president of Economics and Technology, a Boston consulting firm. "So if a CLEC wants to do business throughout eastern Massachusetts, it needs 203 exchanges. That's more than two million phone numbers," Selwyn explains.

In such a situation, the vast majority of phone numbers inevitably go to waste. Selwyn says he knows of CLECs that use only 10 numbers in some of their 10,000-number blocks. ◪



Area code madness

New local carriers that need blocks of phone numbers are now the principal cause of the rapid growth of area codes in California.

SOURCES: CALIFORNIA PUBLIC UTILITIES COMMISSION, SAN FRANCISCO; NEW PARADIGM RESOURCES GROUP, CHICAGO

BellSouth-Qwest forge network alliance

BY TIM GREENE

You can start thinking of BellSouth and Qwest as a single source of network services.

That's because BellSouth last week made a $3.5 billion investment in No. 4 long-distance carrier Qwest.

The deal will start as a marketing alliance but will eventually grow into a partnership through which BellSouth will use Qwest's 18,500-mile fiber-optic network to provide long-distance and data services.

For now, the two companies will market services jointly. BellSouth will provide local phone services and Qwest will offer data network, Internet and long-distance phone services.

If BellSouth gets permission to sell long-distance services, the companies plan to link their ordering systems, develop new services together and directly sell each other's services.

Until then, the two companies have to walk a fine line with their joint marketing. They will refer customers to each other, but will not sell each other's services outright.

At the moment, federal regulations limit BellSouth's ownership in any long-distance company. But when BellSouth receives regulatory permission to sell long distance, it can boost its 10% investment in Qwest to 20%. ◪

More Online

FIND IT DocFinder 2623 ON FUSION

- A look at how the FCC killed earlier deals between Qwest and other RBOCs.
- The latest BellSouth and Qwest financial and stock news.

www.nwfusion.com

Wan Monitor . Daniel Briere and Christine Heckart

MILLIONAIRES WANTED: MONEY FOR THE TAKING

The telecom industry surely creates more millionaires per day than any other industry. Anybody with a glimmer of an idea can start a company and sell it in a couple of years for at least a few hundred million dollars. So why not get a piece of the action?

TeleChoice believes many of the application service providers (ASP) that will emerge over the next decade will come out of the enterprise ranks. We'll explain the logic of this assertion and then wait a few years to measure the reality. By then, if we're wrong, hopefully everyone will have forgotten.

Say you and your team set up an extranet, which includes e-commerce. To do this successfully, you'll go through a lengthy and probably painful process, including the following:

- Weighing the pros and cons of outsourcing the content hosting and server management to a service provider, and if you outsource, deciding whether you'll use shared or dedicated servers.
- Determining the level of customization required to incorporate an e-commerce or complete e-business package.
- Figuring out whether outsourcing, development or using an off-the-shelf package with developer kits for customization is the right way to go.
- Determining if the site will be mirrored, and thus contend with synchronization issues, or won't be but will then have a higher potential for failure.
- Putting your backup system and methodology in place.
- Implementing or ensuring appropriate load-balancing techniques.
- Figuring out the required bandwidth for the site — average and peak — as well as the redundancy needed on Internet links.
- Integrating the site with the back-office systems and supply chain.
- Selecting and implementing your security plan, including authentication and firewalls.
- Evaluating how you'll support credit card authorization.
- Selecting a tool for tracking and managing the site.
- Implementing the databases, search engines and caching equipment.
- And, of course, making the site easy to use and enticing.

When you're finished, you'll be an expert at setting up an extranet for your particular industry. And maybe you will ask yourself, wouldn't it be nice if I could get all of this in one package from a company that really understands my industry and my unique needs? And poof! An ASP is born.

If you don't want the risk and uncertainty of going it alone, your company may find the opportunity interesting. After all, your company already will have a fabulous extranet up and running, so why not make money from it?

The bottom line is we are entering a phase in the industry's evolution where end users make outstanding candidates to start ASPs. You'd sell highly integrated services back into your own industry and gain a competitive advantage by using your knowledge of the environment, problems, applications and preferences.

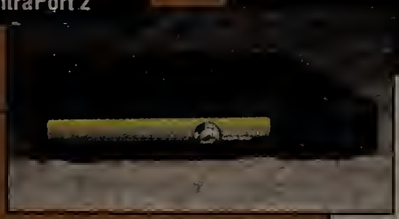
Briere is president and Heckart is vice president of TeleChoice, a consultancy in Boston. They can be reached at dbriere@telechoice.com and checkart@telechoice.com.

Real VPN for Real Networks.

Nothing beats the IntraPort™ family for scalability, client support, and security. And REAL high-speed remote access.

VPN that fits your network — today and tomorrow.

IntraPort 2



Designed for small to medium-sized companies or branch offices that need up to 64 simultaneous remote access sessions and/or up to 16 site-to-site connections.

IntraPort 2+

For medium-sized businesses or large branch offices that need up to 200 simultaneous remote access sessions and/or up to 32 site-to-site connections.

Enterprise-8

Designed for large central sites that need scalability up to 40,000 simultaneous remote access sessions and/or up to 512 site-to-site connections.

The IntraPort™ VPN access server family delivers more features and flexibility than any VPN product available—bar none. With the industry's broadest client and protocol support, IntraPort integrates VPN into your existing network and allows remote users to continue to work securely on the platforms they're comfortable with. That means your remote and site-to-site users will be productive immediately.

Best of all, IntraPort VPN solutions fulfill the high-speed promise of DSL and cable-modem access. The IntraPort family is built specifically to take full advantage of these high-bandwidth technologies and ensure your network runs at the fastest speeds possible.

So whether you need VPN access for ten or 10,000 users, the IntraPort family is the solution. Give us a call. Or check out our specs at: www.compatible.com/vpn_now/ and sign up for our VPN application success handbook, and get real about VPN now!

All Intraport family products feature:

- Site-to-Site Protocols: IP-in-IP, IPX-in-IP, AppleTalk-in-IP, Bridging in IP
- Client Access Protocols: IP-in-IP for all clients; IPX-in-IP for Windows clients
- Clients included at no charge: Windows 95, Windows 98, Windows NT (4.0 and later), PowerMac (System 8.0 and later), Intel-based Linux, Sun Solaris
- Security: IPSEC/IKE, co-processor-based DES/3DES encryption.

Compatible Systems

the **VIRTUAL** leader

1.888.356.0283 | www.compatible.com/vpn_now/

Free Product info enter NWInfoXpress #54 online @ **www.networkworld.com/infoxpress**

Want to migrate from Token-Ring to Fast Ethernet in 5 minutes?

No problem.

A unique solution to a common problem – now it only takes 5 minutes to migrate from Token-Ring to Fast Ethernet.

Olicom's new CrossFire™ 8730 Fast Ethernet Translation Switch is the first in an innovative new range of products giving Token-Ring users seamless, wire-speed access to Fast Ethernet networks. With Olicom's expertise and products, we can make that duty effortless.

Priced well below competitive solutions, the 20-port CrossFire 8730 leverages Olicom's Token-Ring expertise to resolve the complex technical issues of connecting Token-Ring LANs to Fast Ethernet installations. The result is a Fast Ethernet Switch with Token-Ring robustness. Standard features include Plug and Play installation, automatic configuration, impressive performance, a host of user-friendly management capabilities, and advanced auto-recovery technology for ensuring mission-critical availability.

olicom
ClearStep℠
The Token-Ring Migration Strategy

The CrossFire 8730 is just one of many exciting solutions described in ClearStep℠, Olicom's unique migration strategy for cost-effectively upgrading Token-Ring customers to future-proof, high-speed, mission-critical networking. If you would like more information about how Olicom's new range of Fast Ethernet products can boost your network performance, please visit www.olicom.com or call **1-800-841-9292** for further details.

olicom

Olicom offices: USA (+1) 972 907 4600, Australia (+61) 2 9955 1755, Benelux (+31) 73 6 49 15 46, Canada (+1) 416 977 2400, Denmark (+45) 45 27 00 00, France (+33) 1 4191 1717, Germany (+49) 6105 2892-0, Ibérica (+34) 91 372 9814, Japan (+81) 3 5753 0221, Poland (+48) 58 348 15 00, South Africa (+27) 11 432 3295, Sweden (+46) 8 594 704 94, United Kingdom (+44) 1494 556600. **www.olicom.com**

CrossFire is a trademark, and ClearStep is a service mark of Olicom A/S. Olicom is a registered trademark. 1999 copyright Olicom A/S.

Free Product info enter NWInfoXpress #61 online @ **www.networkworld.com/infoxpress**

Take the guesswork out of choosing the right VPN solution.

NetworkWorld TECHNICAL SEMINARS

VPN '99

MAXIMIZING COST SAVINGS AND BUSINESS EFFICIENCIES

Have confidence in the solution you choose.

Network World Technical Seminars has brought together one of the industry's leading VPN experts, Eric Zines of TeleChoice, Inc., and leading VPN solution providers in a comprehensive one-day seminar. The program is designed specifically to help you better understand this technology, the factors you must consider during the decision-making process, and the information you need to choose the right VPN solution for your business. Mr. Zines will explain not just how VPNs work, but how they can be applied to real-world situations. Equally as important is knowing which solution provider can best guide you through the implementation process. This seminar will give you the unique opportunity to discuss your specific needs via live, face-to-face interaction with the industry's leading VPN solution providers.

Benefits of Attending

- Discover how VPNs can benefit your enterprise
- Explore future directions of VPNs and their effect on your business
- Compare and contrast product and service offerings available for implementing a VPN
- Gain insight into the network management and administration issues associated with VPNs

Learn from the Leader

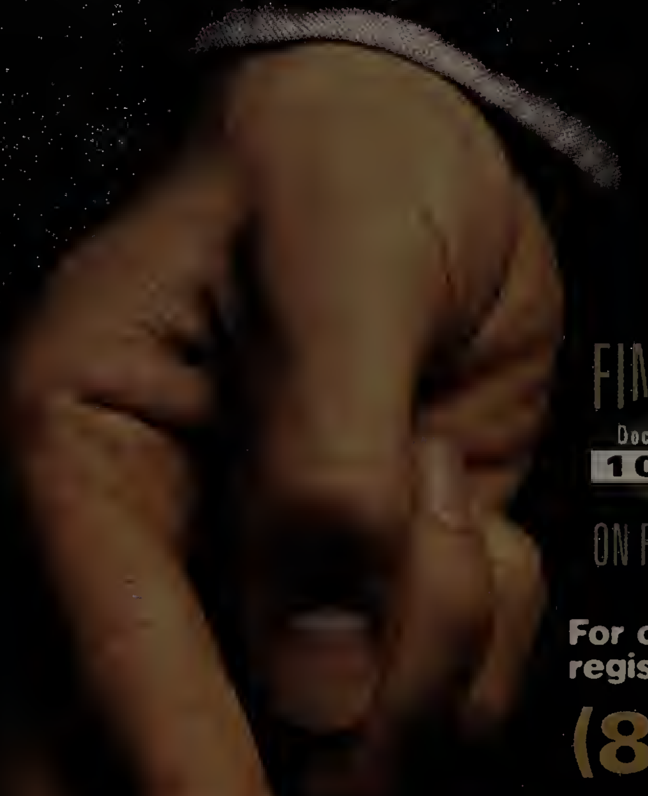
NetworkWorld
THE LEADER IN NETWORK KNOWLEDGE
Print • Online • Events

Network World Technical Seminars is known throughout the networking community for providing IT professionals with expert, unbiased education on the latest technologies and trends shaping today's mission-critical networks. This reputation combined with our 100% satisfaction guarantee makes us the educator of choice in the networking industry.

Eric Zines, Senior Market Analyst with TeleChoice, Inc., has developed and will present this seminar. He continually tracks and interprets the rapid changes in the VPN market and will share with you his valuable insights, difficult to find anywhere else.

1999 Seminar Tour

Chicago • April 6
Denver • April 7
San Francisco • April 20
Seattle • April 21
Boston • May 4
New York • May 5
Philadelphia • May 26
Washington, DC • May 27



Register Today!

FIND IT
DocFinder
1029
ON FUSION

Seminar Registration Fee — $450

Bring your colleagues and take advantage of our Team Discounts
2 registrants $400 each
3 registrants $350 each
Every 4th registration is FREE

For complete program agenda and registration information, contact us at

(800)643-4668

www.nwfusion.com/seminars

On-Site Seminars

If you are interested in a customized on-site presentation of this seminar at your company, please call Bill Bernardi at (508) 820-7506. bbernard@nww.com.

SPONSORED BY

Altiga Networks
Ascend
AT&T
Check Point Software Technologies Inc.
Chrysalis-ITS
Compatible Systems the VIRTUAL leader
concentric network
GTE Internetworking
Intelispan
NetScreen
RADGUARD
Inacom Information Systems
RedCreek
Sprint
TimeStep

If you are interested in sponsorship opportunities, please contact Andrea D'Amato at (508) 820-7520 or adamato@nww.com.

NetworkWorld FREE Subscription Application!

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

☐ **YES** I want to receive/continue to receive my FREE subscription to *Network World.*

No, thank you. ☐

Sign Here

Signature (required) Date

TO QUALIFY: You must supply your company name and address. If military, please specify branch/base. If government, please specify division.

Name Title

Company

Division/Mail Stop/Military Branch or Base

Street Address

City State Zip

If there is a parent company, please provide name: ____________________

☐ My home address is also my business address.

Optional delivery address: Enter your home address below if your company will not accept delivery at your business address:

Street Address City State Zip

Business phone (____) ____________________ FAX (____) ____________________

Internet E-mail address ____________________

Would you like to receive our weekly e-mail news update "inFusion"? ☐ Yes ☐ No

Would you like to receive periodic information via e-mail on 3rd party networking products/services? ☐ Yes ☐ No

Publisher reserves the right to serve only those individuals who meet publication qualifications. ALL questions must be answered. Incomplete forms will not be processed. Free subscriptions available to qualified US applicants. Foreign and Canadian rates available upon request.

B499

1. What is the principal business activity at your location?

(check ONE only)

01. ☐ Manufacturing (other)
02. ☐ Finance/Banking
03. ☐ Insurance/Real Estate/Legal
04. ☐ Health Care Services
05. ☐ Hospitality/Entertainment/Recreation
06. ☐ Media/TV/Cable /Radio/Print
07. ☐ Retail/Wholesale Trade/Business Services
08. ☐ Transportation
09. ☐ Utilities
10. ☐ Education
11. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
12. ☐ Government (Federal/State/Local)
13. ☐ Military
14. ☐ Aerospace
15. ☐ Consulting (Independent)*
16. ☐ Carriers/Interconnects
17. ☐ Internet Service Provider (ISP)
18. ☐ Manufacturing (Computer/Communications/OEM)
19. ☐ Resellers of Computer/Network Products (VARs, VADs)
20. ☐ Systems/Network Integrators*
21. ☐ Distributors (Computer/Communications)*
22. ☐ Other (please specify) ____________

* *Please complete form based on largest client.*

2. What is your job function?

(check ONE only)

NETWORK IS MANAGEMENT:

1. ☐ Network Management
2. ☐ LAN Management
3. ☐ Datacom/Telecom Management
4. ☐ IS/IT/MIS/CIO/Systems Management
5. ☐ Internet/Intranet/Electronic Commerce Mgmt., Webmaster
6. ☐ Engineering Management
7. ☐ Corporate Management (CEO, Pres., VP, Dir., Mgr., Financial Management)
8. ☐ Consultant (Independent)
9. ☐ Other ____________

3. What is the estimated value of Network equipment and services that you specify, recommend or approve the purchase of?

(Please print the appropriate number code on the line next to each product category. Please complete ALL categories A–N.)

1. $100 Million or more
2. $50 Million to $99.9 Million
3. $25 Million to $49.9 Million
4. $10 to $24.9 Million
5. $1 to $9.9 Million
6. $100,000 to $999,999
7. $50,000 to $99,999
8. Under $50,000
9. None of the above

A ______ Large Systems (Mainframes/Minis)
B ______ Desktops (Micros/Laptops/Workstations)
C ______ Servers
D ______ LANs
E ______ WAN Equipment
F ______ Carrier Services
G ______ Internetworking
H ______ Internet
I ______ Intranet
J ______ Extranet
K ______ Remote Access
L ______ Peripherals
M ______ Software
N ______ Service/Support

4. What is the total number of sites for which you have purchase influence?

(check ONE only)

1. ☐ 100+ 2. ☐ 50 – 99 3. ☐ 20 – 49 4. ☐ 10 – 19 5. ☐ 2 – 9 6. ☐ 1 7. ☐ None

5. What is the total number of Servers/Clients/LANs installed/planned at your location/in your entire organization?

(check ONE box in each column)

SERVERS At Location A		SERVERS Entire Org. B	CLIENTS At Location C		CLIENTS Entire Org. D	LANS At Location E		LANS Entire Org. F
☐	1. 50,000+	☐	☐	1. 50,000+	☐	☐	1. 50,000+	☐
☐	2. 10,000 to 49,999	☐	☐	2. 10,000 to 49,999	☐	☐	2. 10,000 to 49,999	☐
☐	3. 1,000 to 9,999	☐	☐	3. 1,000 to 9,999	☐	☐	3. 1,000 to 9,999	☐
☐	4. 100 to 999	☐	☐	4. 100 to 999	☐	☐	4. 100 to 999	☐
☐	5. 50 to 99	☐	☐	5. 50 to 99	☐	☐	5. 50 to 99	☐
☐	6. 10 to 49	☐	☐	6. 10 to 49	☐	☐	6. 10 to 49	☐
☐	7. 1 to 9	☐	☐	7. 1 to 9	☐	☐	7. 1 to 9	☐
☐	8. none	☐	☐	8. none	☐	☐	8. none	☐

6. What is your scope and involvement in purchasing decisions for network products and services for your enterprise?

A. Scope (check one only)

1. ☐ Corporate/Enterprise
2. ☐ Department
3. ☐ None

B. Involvement (check ALL that apply)

1. ☐ Create Network Strategy
2. ☐ Recommend/Specify
3. ☐ Approve
4. ☐ Evaluate
5. ☐ Determine the Need
6. ☐ None

7. What is the estimated number of employees at your location/in entire organization?

(check ONE in each section)

A. At your location:

1. ☐ Over 20,000
2. ☐ 10,000 – 19,999
3. ☐ 5,000 – 9,999
4. ☐ 2,500 – 4,999
5. ☐ 1,000 – 2,499
6. ☐ 500 – 999
7. ☐ 250 – 499
8. ☐ 249 or less

B. Entire organization:

1. ☐ Over 20,000
2. ☐ 10,000 – 19,999
3. ☐ 5,000 – 9,999
4. ☐ 2,500 – 4,999
5. ☐ 1,000 – 2,499
6. ☐ 500 – 999
7. ☐ 499 or less

8. Please indicate the products/services that you are currently involved in purchasing or plan to purchase:

(check ALL that apply)

A. Currently Involved in purchasing B. Plan to purchase

INTERNET/INTRANET

A B
- ☐ 01. ☐ Internet Services/Web Hosting
- ☐ 02. ☐ Firewalls/Security/Encryption
- ☐ 03. ☐ Web Servers/Software
- ☐ 04. ☐ Web Servers/Hardware
- ☐ 05. ☐ TCP/IP Software
- ☐ 06. ☐ Management/Monitoring Software
- ☐ 07. ☐ Voice/Video Over IP
- ☐ 08. ☐ VPN Equipment/Services
- ☐ 09. ☐ Legacy Integration Tools (Web to Host)
- ☐ 10. ☐ Web Development Tools (JAVA, ActiveX, etc.)
- ☐ 11. ☐ Push Technology
- ☐ 12. ☐ Web Browsers
- ☐ 13. ☐ Intranet Applications/Groupware
- ☐ 14. ☐ Search/Retrieval Products (web crawler)
- ☐ 15. ☐ Electronic Commerce Tools
- ☐ 16. ☐ Web Authoring Tools
- ☐ 17. ☐ Other ____________

LOCAL-AREA NETWORKS/ INTERNETWORKING

A B
- ☐ 18. ☐ Local-Area Networks
- ☐ 19. ☐ Network Operating System Software
- ☐ 20. ☐ Servers
- ☐ 21. ☐ Print Servers
- ☐ 22. ☐ Routers
- ☐ 23. ☐ ATM Switches
- ☐ 24. ☐ Token-Ring Switches
- ☐ 25. ☐ Ethernet Switches
- ☐ 26. ☐ Fast Ethernet
- ☐ 27. ☐ Gigabit Ethernet
- ☐ 28. ☐ Layer 3 Switches
- ☐ 29. ☐ Network Storage Devices (NASs, SANs)
- ☐ 30. ☐ LAN Storage/Backup
- ☐ 31. ☐ Optical Storage/Backup/Jukeboxes
- ☐ 32. ☐ Disk Storage/Backup
- ☐ 33. ☐ Tape Storage/Backup
- ☐ 34. ☐ RAID Storage/Backup
- ☐ 35. ☐ Network Test/Diagnostic Tools
- ☐ 36. ☐ Cables, Connectors, Baluns
- ☐ 37. ☐ UPS
- ☐ 38. ☐ Network Interface Cards (NICs)
- ☐ 39. ☐ Hubs
- ☐ 40. ☐ Intelligent Hubs
- ☐ 41. ☐ Stackable Hubs
- ☐ 42. ☐ Bridge/Router
- ☐ 43. ☐ SNMP Network Management
- ☐ 44. ☐ Gateways
- ☐ 45. ☐ Concentrators/Repeaters
- ☐ 46. ☐ Other (please specify) ____________

COMPUTERS/PERIPHERALS

A B
- ☐ 47. ☐ Thin Clients/Network Computers (NCs)
- ☐ 48. ☐ Laptops/Notebooks/Sub-Notebooks
- ☐ 49. ☐ Micros/PCs
- ☐ 50. ☐ Minis
- ☐ 51. ☐ Mainframes
- ☐ 52. ☐ Workstations
- ☐ 53. ☐ Printers/Network Printers
- ☐ 54. ☐ CD-ROM/DVD
- ☐ 55. ☐ Fax/Modem Boards
- ☐ 56. ☐ Memory/Chips/Boards/Cards
- ☐ 57. ☐ Other ____________

REMOTE/WIRELESS COMPUTING

A B
- ☐ 58. ☐ Remote Access Products
- ☐ 59. ☐ Remote Access Services
- ☐ 60. ☐ PDAs
- ☐ 61. ☐ PCMCIA Devices
- ☐ 62. ☐ Wireless Data Equipment/Services
- ☐ 63. ☐ Cellular Equipment & Services
- ☐ 64. ☐ Other (please specify) ____________

SOFTWARE/APPLICATIONS

A B
- ☐ 65. ☐ Network Management
- ☐ 66. ☐ Systems Management
- ☐ 67. ☐ Security
- ☐ 68. ☐ Communications Software
- ☐ 69. ☐ Terminal Emulation
- ☐ 70. ☐ Operating Systems
- ☐ 71. ☐ Applications Development Tools
- ☐ 72. ☐ Database Management/ RDBMS
- ☐ 73. ☐ Groupware
- ☐ 74. ☐ Workflow
- ☐ 75. ☐ EDI
- ☐ 76. ☐ E-mail
- ☐ 77. ☐ Desktop Videoconferencing
- ☐ 78. ☐ Imaging
- ☐ 79. ☐ Suites/Server Suites (Back Office, etc.)
- ☐ 80. ☐ Middleware
- ☐ 81. ☐ Document Management
- ☐ 82. ☐ Site Metering Tools
- ☐ 83. ☐ Computer Telephony Integration (CTI)
- ☐ 84. ☐ Data Warehousing
- ☐ 85. ☐ Anti Virus Software
- ☐ 86. ☐ Multimedia
- ☐ 87. ☐ Yr. 2000 Conversion Software (Y2K)
- ☐ 88. ☐ Helpdesk
- ☐ 89. ☐ Web Based Management Tools
- ☐ 90. ☐ Directory Services
- ☐ 91. ☐ Other (please specify) ____________

WIDE-AREA NETWORK EQUIPMENT & SERVICES

A B
- ☐ 92. ☐ 56 Kbps Modems
- ☐ 93. ☐ Under 56 Kbps Modems
- ☐ 94. ☐ Cable Modems
- ☐ 95. ☐ Asynchronous Transfer Mode (ATM)
- ☐ 96. ☐ Frame Relay Equipment/Services
- ☐ 97. ☐ ISDN Equipment & Services
- ☐ 98. ☐ FT-1/T-1/T-3 Multiplexers/Services
- ☐ 99. ☐ xDSL Services/Products
- ☐ 100. ☐ Diagnostic/Test Equipment
- ☐ 101. ☐ DSU/CSU
- ☐ 102. ☐ PBXs
- ☐ 103. ☐ Videoconferencing
- ☐ 104. ☐ Leased Lines
- ☐ 105. ☐ Switched Data
- ☐ 106. ☐ Virtual Private Networks (VPN)
- ☐ 107. ☐ FRADs
- ☐ 108. ☐ Managed LAN/Router Services
- ☐ 109. ☐ Other ____________
- ☐ 110. ☐ Outsourcing/Systems Integration Services
- ☐ 111. ☐ Education/Training Services
- ☐ 112. ☐ None of the above (1–111)

9. Please indicate the platforms that are currently installed/planned:

(check ALL that apply)

A. Currently installed B. Planned for purchase

NETWORK PROTOCOLS

A B
- ☐ 01. ☐ TCP/IP
- ☐ 02. ☐ IPv6
- ☐ 03. ☐ SNA
- ☐ 04. ☐ Novell IPX/SPX
- ☐ 05. ☐ APPC/APPN/LU 6.2
- ☐ 06. ☐ NETBIOS
- ☐ 07. ☐ NFS
- ☐ 08. ☐ SNMP
- ☐ 09. ☐ Other ____________

LAN ENVIRONMENT

A B
- ☐ 10. ☐ Gigabit Ethernet
- ☐ 11. ☐ Switched Ethernet
- ☐ 12. ☐ Fast Ethernet (100 Megabit Ethernet)
- ☐ 13. ☐ Ethernet
- ☐ 14. ☐ ATM
- ☐ 15. ☐ Token Ring/Token Ring Switching
- ☐ 16. ☐ IP Switching
- ☐ 17. ☐ Layer 3 Switching
- ☐ 18. ☐ FDDI
- ☐ 19. ☐ 100Base-T
- ☐ 20. ☐ 10Base-T
- ☐ 21. ☐ Fibre Channel
- ☐ 22. ☐ Other ____________

NETWORK OPERATING SYSTEM

A B
- ☐ 23. ☐ Windows NT
- ☐ 24. ☐ Windows NT/Advanced Server
- ☐ 25. ☐ Novell IntranetWare
- ☐ 26. ☐ Novell (NetWare 5.X)
- ☐ 27. ☐ Novell (NetWare 4.X)
- ☐ 28. ☐ Novell (NetWare 2.X, 3.X)
- ☐ 29. ☐ Microsoft (LAN Manager)
- ☐ 30. ☐ Banyan (VINES)
- ☐ 31. ☐ IBM (Server)
- ☐ 32. ☐ Other (please specify) ____________

COMPUTER OPERATING SYSTEM

A B
- ☐ 33. ☐ NT Server
- ☐ 34. ☐ NT Workstation
- ☐ 35. ☐ Unix/Xenix/AIX/SCO
- ☐ 36. ☐ Solaris
- ☐ 37. ☐ Windows
- ☐ 38. ☐ Windows 95
- ☐ 39. ☐ Windows 98, .9x
- ☐ 40. ☐ DOS
- ☐ 41. ☐ OS/2, OS/2 Warp
- ☐ 42. ☐ IBM MVS/VM/VSE
- ☐ 43. ☐ Digital VMS
- ☐ 44. ☐ Macintosh
- ☐ 45. ☐ Other ____________
- ☐ 46. ☐ None of the above (1–45)

10. Which of the following Servers/Clients do you have installed/planned at your location?

(check ALL that apply in each column)

	A. Servers		B. Clients		A. Servers		B. Clients
Power PC	☐	01.	☐	486, 386, 286	☐	07.	☐
Power Mac	☐	02.	☐	Sun Sparc	☐	08.	☐
Mac Other	☐	03.	☐	Risc	☐	09.	☐
Multiprocessor Servers	☐	04.	☐	Alpha	☐	10.	☐
Pentium II (PII)	☐	05.	☐	Other	☐	11.	☐
Pentium/Pentium Pro	☐	06.	☐				

11. Which of the following hardware platforms are installed/planned in your company?

(check ALL that apply)

A - Mainframes (Large Scale)

1. ☐ IBM
2. ☐ Amdahl
3. ☐ Cray
4. ☐ Hitachi
5. ☐ Unisys
6. ☐ Other ____________

B - Minis (Midrange)

1. ☐ IBM RS/6000
2. ☐ IBM AS/400
3. ☐ Digital
4. ☐ Tandem
5. ☐ Unisys
6. ☐ AT&T GIS
7. ☐ H-P
8. ☐ Data General
9. ☐ Other ____________

C - Workstations

1. ☐ Sun Microsystems
2. ☐ Silicon Graphics
3. ☐ Digital
4. ☐ H-P
5. ☐ IBM
6. ☐ Other ____________

12. What is the estimated gross revenue of your entire company/institution?

(check ONE only)

01. ☐ $20 billion or more
02. ☐ $10 billion to $19.9 billion
03. ☐ $1 billion to $9.9 billion
04. ☐ $500 million to $999.9 million
05. ☐ $100 million to $499.9 million
06. ☐ $50 million to $99.9 million
07. ☐ $10 million to $49.9 million
08. ☐ $5 million to $9.9 million
09. ☐ $4.9 million or less
10. ☐ None of the above

13. For which areas outside of North America do you have purchase influence?

(check ALL that apply)

1. ☐ Europe 2. ☐ Asia 3. ☐ South America 4. ☐ Australia 5. ☐ Middle East 6. ☐ None

FORM: 9801

Please indicate the names and job functions of other individuals at your location to whom you would like us to send a copy of **NetworkWorld**

NAME ______________________ JOB FUNCTION ______________

NAME ______________________ JOB FUNCTION ______________

NAME ______________________ JOB FUNCTION ______________

NAME ______________________ JOB FUNCTION ______________

NAME ______________________ JOB FUNCTION ______________

Be Sure You Have Completed the Following:

- ☑ Answered ALL the questions
- ☑ Signed and dated the form
- ☑ Provided your name, title and company address

Thank You!

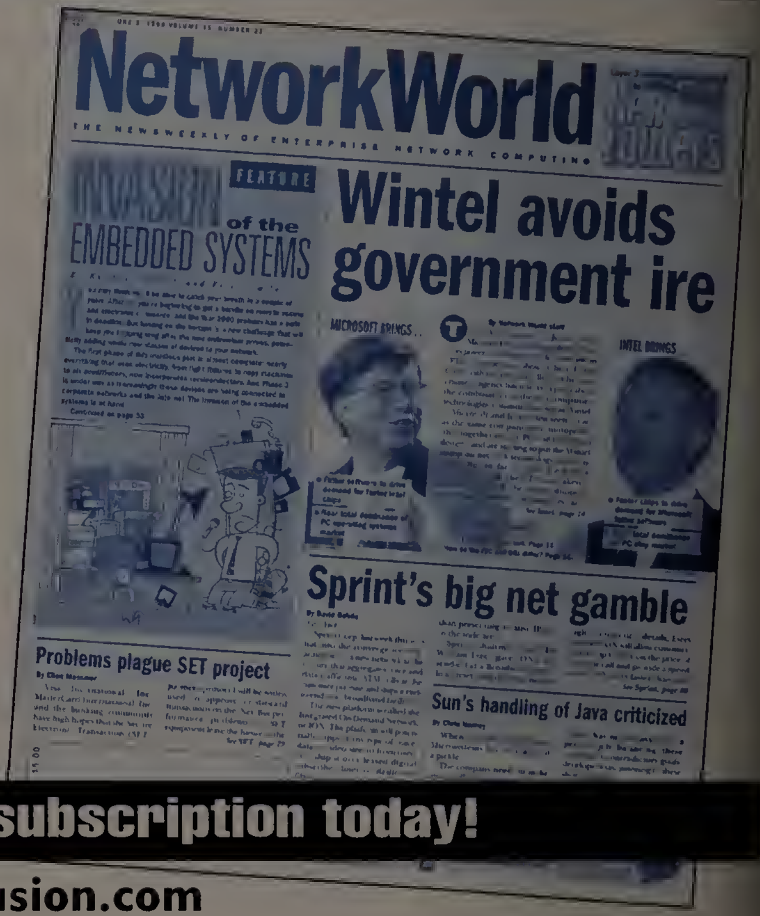
▼ 1. FOLD HERE & MAIL TODAY ▼

NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

We're not just the #1 networking newsweekly...we're a full-service company providing you with the best information resources to help you conquer your networking challenges. Your qualified subscription brings you...

- 51 FREE issues of *Network World* magazine
- FREE access to **NW Fusion**, THE web site for the Network IS industry
- Access to *Network World* software, seminars and more!



NetworkWorld

THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING

FEATURE

INVASION of the EMBEDDED SYSTEMS

Wintel avoids government ire

MICROSOFT BRINGS

INTEL BRINGS

Sprint's big net gamble

Problems plague SET project

Sun's handling of Java criticized

Send for your FREE Network World subscription today!

or apply on-line at: http://www.nwfusion.com

▼ 2. FOLD HERE & MAIL TODAY ▼

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO 1752 NORTHBROOK IL

POSTAGE WILL BE PAID BY ADDRESSEE

NetworkWorld
THE NEWSWEEKLY OF ENTERPRISE NETWORK COMPUTING
PO BOX 3091
NORTHBROOK IL 60065-9928

Briefs

Secure Computing next month will release a Java-based smart card called the e.iD multicard designed to authenticate network users. This electronic identity card is about the size of a credit card and features a built-in keypad that supports use of Secure Computing's SafeWord dynamic password system. The first field tests of e.iD multicard will be with PalmPilot devices and Microsoft's CE platform.

Secure Computing's new smart card stores digital certificates.

Secure Computing: (800) 379-4944

CACI Products is set to ship Comnet Predictor 2.0, software to help net managers model frame relay networks. Predictor lets users try what-if scenarios on the model of a network to see the impact of traffic or infrastructure changes. Version 2.0 will let users change more variables, print several new reports and model more specific devices. Pricing for the software starts at $24,500, and it will ship by the end of the month.

CACI: (619) 824-5200

Stampede Technologies this week will begin shipping TurboGold Server-to-Server software, which accelerates information exchange among Lotus Domino servers over WANs. Stampede says the software can increase Domino-to-Domino replication by up to five times.

Pricing begins at about $1,500 for a single server/single CPU subscription. Additional CPUs cost $500 each.

Stampede: (800) 763-3423

IN-SITE: *Lessons from Leading Users*

Banks and hospitals implement tough security

BY ELLEN MESSMER

What do banks and hospitals have in common? Both are bound by federal regulations to protect sensitive data.

Consequently, banking and health care organizations are frequently the most dedicated users of network security technology. But their experiences show you can take different paths to get to the same goal: ensuring that only authorized users get secure access to privileged data.

Take Overlake Hospital in Bellevue, Wash., for example. The hospital needed to find a way to give physicians remote access to Overlake's intranet-based patient data when the doctors were working from their private offices.

"It's natural to use the Internet for this, but access has to be absolutely secure under the Federal Health Care Financing Administration regulations," says Bruce Elkinton, Overlake Hospital's director of information services.

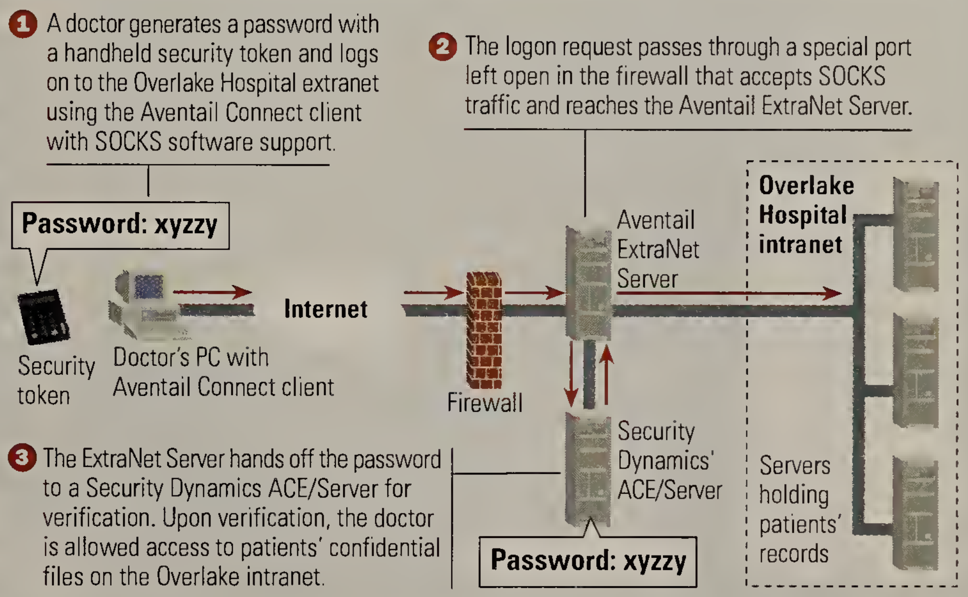
The hospital decided to give physicians private access through its public Web site by using dynamic passwords. Reusable passwords were deemed too risky.

Overlake's net division installed Security Dynamics' ACE/Server for

See **Security**, page 36

Online patient information lookup

Overlake Hospital's extranet for doctors relies on dynamic passwords and SOCKS.



① A doctor generates a password with a handheld security token and logs on to the Overlake Hospital extranet using the Aventail Connect client with SOCKS software support.

② The logon request passes through a special port left open in the firewall that accepts SOCKS traffic and reaches the Aventail ExtraNet Server.

③ The ExtraNet Server hands off the password to a Security Dynamics ACE/Server for verification. Upon verification, the doctor is allowed access to patients' confidential files on the Overlake intranet.

Password: xyzzy
Security token
Doctor's PC with Aventail Connect client
Internet
Firewall
Aventail ExtraNet Server
Security Dynamics' ACE/Server
Password: xyzzy
Overlake Hospital intranet
Servers holding patients' records

Candle illuminates Web page use

BY JEFF CARUSO

SANTA MONICA, CALIF. — The advent of electronic commerce is increasingly linking business fortunes to IT, making it vital for network managers to know whether or not customers enjoy their online shopping experiences.

With that in mind, systems management software vendor Candle has released eBA*ServiceMonitor, a product that measures response times as end users access a company's Web site.

"We really didn't have a good understanding of the experience customers were having" with online banking services, says Brian Lawton, vice president of Web support services at KeyCorp, a financial services company in Cleveland. KeyCorp lets customers retrieve balances, transfer funds and perform other banking functions over the Internet.

Candle's software lets KeyCorp send a Java-based applet to customers accessing the firm's Web site. The applet helps the server measure the time it takes to move data between the two machines.

The software adds about 100 bytes of overhead to every Web page accessed, says Karl Kotalik, director of Candle's response time management business unit.

"We're seeing a lot of data, so much that we're not sure what to do with all of it," KeyCorp's Lawton says.

Candle also offers a service to aggregate data collected by eBA*ServiceMonitor into a central repository, letting net managers see the data in reports via a Web interface.

The product shows how much time users spend on each Web page, as well as the path they take to get through the Web site. It can show response times of the client, network and server.

Candle is one of many vendors starting to provide measurement software like this, says Richard Ptak, vice president of systems and application management for the Hurwitz Group in Framingham, Mass.

The software runs on several Web servers, including Apache 1.3X on Solaris, HP-UX and Windows NT; Microsoft Internet Information Server 3.0; and Netscape Enterprise Server and FastTrack Server 3.X on Solaris, HP-UX and Windows NT. It supports any Web browser that is Java-enabled.

Pricing starts at $1,995 for measuring response time on 10 URLs.

Candle: (800) 843-3970

More Online

FIND IT ON FUSION
DocFinder: 2622

- A Candle white paper on the reasons to capture response time information.
- An overview of Hewlett-Packard's Application Response Measurement.

www.nwfusion.com

Security,
continued from page 35

authenticating identity and distributed SecureID handheld tokens, which generate single-use passwords each time the doctors log on to the Web site.

To control access to and encrypt applications, Overlake decided to use the Aventail ExtraNet Server, which is based on the SOCKS 5.0 standard. One reason Overlake chose this approach is because session-layer SOCKS makes it easy to set up a firewall to permit passage of all authorized data, regardless of the application.

"You only open up one port — the SOCKS port — as the proxy instead of many ports for the applications," says Jeff Bernstein, Overlake's network engineer. All the doctors need is SOCKS client software to make it work.

Secure banking

Banks also have to prove their security mettle according to federal banking laws. At PNC Corp., all data is encrypted point-to-point using link encryptors from IRE Corp. and Cylink.

The bank's largest customers are allowed inside the PNC intranet through a separate Check Point Software firewall, and customer identity is checked through several means, such as third-party tokens.

Debbie Wheeler, PNC's security guru, controls access to the bank's 600 servers.

"We believe in layers of security, so if there is a breach in any one area, there will be a fail-safe," says Debbie Wheeler, PNC's manager of information security consulting and risk mitigation services.

PNC has devised an enterprisewide security policy for its extranet customers and PNC's 27,000 employees. The policy restricts access to files stored on LAN servers and the mainframe. To ensure that the company's 600 servers are set up correctly to support this policy, PNC is deploying Axent Technologies' Enterprise Security Manager (ESM).

"Data is classified as confidential, sensitive or public, and ESM helps our systems administrators see that the PNC security policy is applied for file sharing based on IP addresses or password parameters," Wheeler explains.

To please federal regulators, banks know they have to provide hard proof they have network security measures that work. To that end, Union Bank in Los Angeles called in a security consultant, Predictive Systems, to run a Web security audit based on tests developed by the International Computer Security Association.

"It was an extremely good exercise in terms of Web server management practices and software development," says Kevin Gallagher, senior vice president and division manager for IT planning and control. "On the Web, we see people trying to break in all the time." ◪

RACAL'S DATACRYPTOR™ 2000

THE WORLD'S MOST ADVANCED TRIPLE-DES LINK ENCRYPTOR

The **DC2K** link encryptor is designed to protect valuable data on your network by providing secure communications across a private or public network.

When you compare the features of the **DC2K** to its competitors you'll see that no other link encryptor offers you the *benefits of strong security, choice of algorithms, SNMP manageability, and protection from obsolescence at any price.*

- Secure Data Communications
- DES, 3DES, SkipJack and Other Algorithms
- X.509 Certificate Based Public Key Management
- Compatible with SNMP Managers
- Secure Remote Configuration
- Electronically Loadable Algorithms, Including National and Custom Algorithms, Preventing Obsolescence
- Sealed Tamper-Evident Case with Two Zones of Physical Security
- Comprehensive Diagnostic Testing
- Secure Link Element Manager for Windows 95 and NT Using PPP
- Year 2000 Compliant
- Designed to Comply with FIPS 140-1 Level 3 and ITSEC Level E3

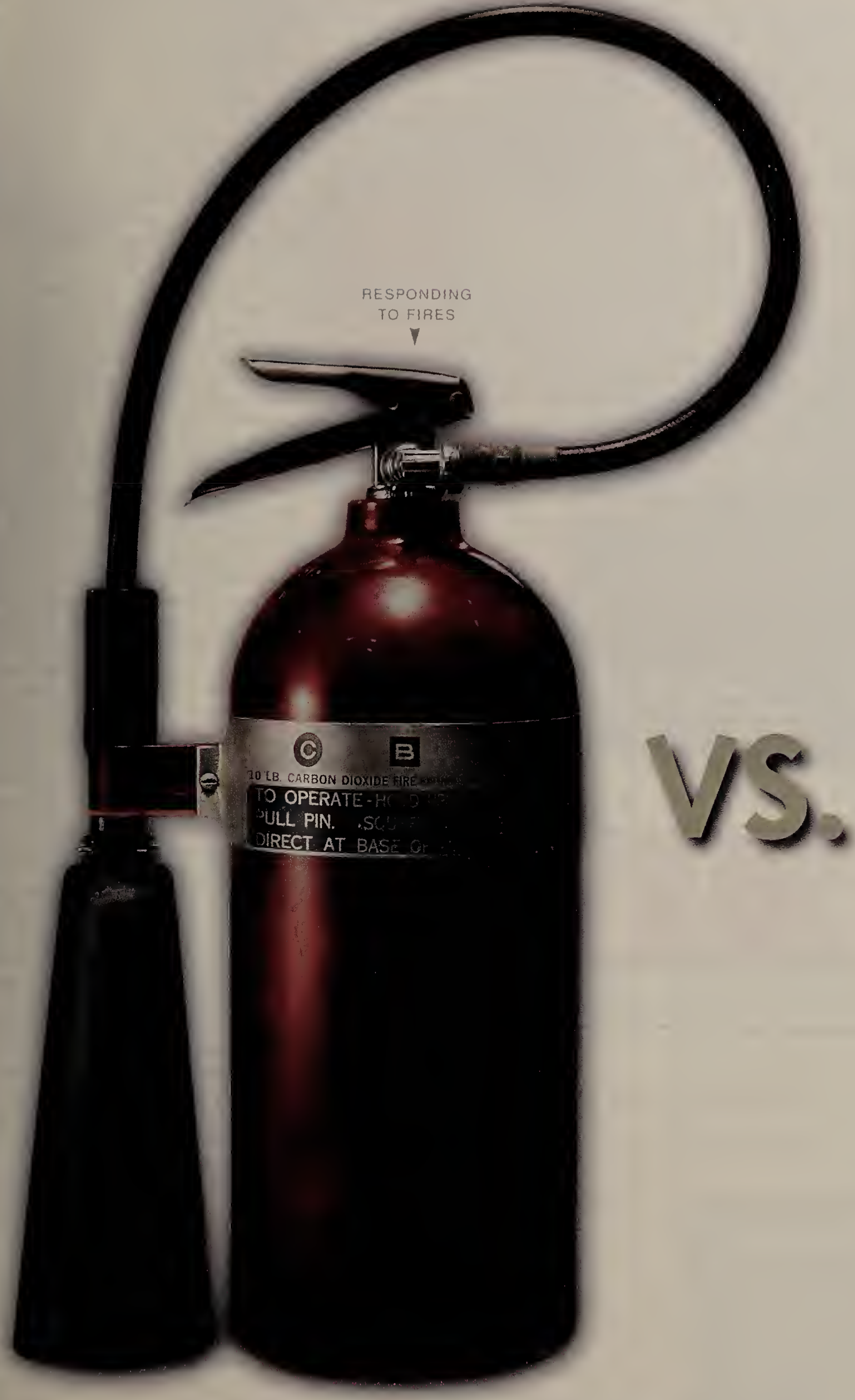
NOW take advantage of our
SPECIAL OFFER:
Turn in your existing encryptor and receive up to $1000 rebate toward the purchase of a new DC2K!

To find out more call:
1-888-744-4976 or 1-954-846-4700

Racal Security & Payments
LINK TO A SECURE FUTURE
RACAL

Racal, Racal Security & Payments and Datacryptor 2000 (DC2K) are trademarks of Racal Electronics Plc. ©1999 All rights reserved. 2/99 PBA-1824
Free Product info enter NWInfoXpress #63 online @ **www.networkworld.com/infoxpress**

PROACTIVE SERVER HEALTH MONITORING



Seagate Software
Seagate
Manage
Exec
Proactive Server Health Monitoring, Alerting and Diagnosis Tool
5
KEEPING
YOUR COOL

Why run around putting out fires, when you can pre-empt them altogether from your desk? (Or *anywhere* via the web.) Seagate Manage Exec proactively monitors, analyzes, and reports on Windows NT and Novell NetWare systems' health, alerting you to problems before users are impacted

1-800-729-7894 ext. 82415

www.seagatesoftware.com

Seagate Software
Information, the way you want

©1998 Seagate Software, Inc. Seagate Manage Exec, Seagate Software and the Seagate logo are trademarks of Seagate Technology. Outside of the US and Canada call 1-407-531-750

Free Product info enter NWInfoXpress #65 online @ **www.networkworld.com/infoxpress**

'Net Insider . Scott Bradner

DOES BIG BLUE'S LOU HAVE A CLUE?

IBM has long been the object of vague disdain by many Internet geeks.

Somehow IBM seemed like a dinosaur from the old days when mainframes were the centers of the corporate information technology world — those bad old days when one had to persuade the guardians of the mainframe to install the application you wanted to use.

IBM seemed to many in the Internet generation to not "get it" when it came to the basic fact that on the Internet, applications are on the local hosts and not just brought to you by someone in the computer center.

It may be time to reevaluate some of these assumptions and notions, but not all.

IBM has just published its annual report, which contains a "Dear fellow investor" letter from IBM Chairman Lou Gerstner (www.ibm.com/annualreport/1998/letter/ibm98arlsen01.html). This is quite an interesting document that gives some insight into just what IBM's boss thinks is going on Internet-wise.

IBM is a big company. Actually that's not quite accurate — IBM is a very big company. IBM did $81.7 billion worth of business last year, up from $64.1 billion in 1994. It's true that Wall Street does not value IBM (at $156 billion) as high as what some people have said is the product of IBM's biggest blunder, Microsoft (at $437 billion). This is in spite of the fact that Microsoft only did about one-sixth the business of IBM ($14.5 billion) last year.

I expect the latter difference is more a reflection of Wall Street's rose- (or is it greedy green?) colored glasses about anything that seems Internet-related than of any reasoned view of the relative potential of the two companies.

Lou writes: "What makes 1999 different, though, is that a historic shift . . . [the Internet] is reshaping everything: how we work, how we shop, how we interact with our governments, how we learn, what we do at home.

Every day it becomes more certain that the Internet will take its place alongside the other great transformational technologies that first challenged, and then fundamentally changed, the way things are done in the world."

This is an important realization from a company that once thought it could own the corporate data network. Gerstner goes on to say "the 'Net is about mainstream business, not browsing, about conducting real commerce, not merely accessing content."

This is an understanding that far too many of IBM's competitors have yet to grasp.

Lou and at least some of the people at IBM understand that the Internet is creating new business models, not just new businesses. Only one thing reminds me of the IBM of old: Lou's vaguely sinister concept of "Pervasive Computing," which sounds too much like the old computer center people knowing what was best for me.

Disclaimer: There is nothing pervasive at Harvard other than history, so the above must be my own thoughts.

Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@harvard.edu.

BUILD IT. CONNECT IT. MANAGE IT.

STACK IT.

ISO 9001

with LANCAST CenturyStack™ 8100 Hubs

Looking for flexible connectivity that's affordable?

Then STACK IT with LANCAST CenturyStack 8100 Series Hubs. Not only do you get the performance LANCAST products are famous for, you get the perfect plug-and-play solution for your Ethernet and Fast Ethernet LANs. It's also perfectly scalable. You can stack up to four unmanaged CenturyStack hubs for a maximum of 64 ports and up to six managed CenturyStack hubs for a total of 144 ports. And all ports are 10/100 Mbps auto-sensing. An internal switch module allows 10 and 100 Mbps domains to communicate and only one module is required per stack. Plus the CenturyStack Managed hubs are managable via a web-browser, SNMP, Telnet and local management. To learn more about our products visit www.lancast.com or call 1-877-LANCAST.

Stackable high performance dual-speed connectivity for workgroups and small office LANs

LANCAST®

12 Murphy Drive, Nashua, NH 03062
www.lancast.com

LANCAST and the LANCAST logo are registered trademarks and CenturyStack is a trademark of LANCAST, Inc.

Free Product info enter NWInfoXpress #106 online @ **www.networkworld.com/infoxpress**

In a world of multiple operating systems, what printers speak your language?

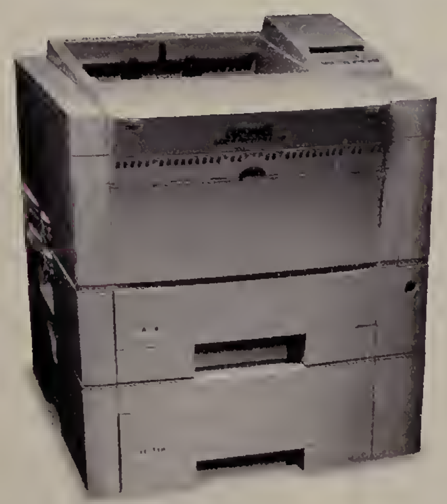
Continuing the 25-year history of quality DIGITAL printing solutions, Compaq now offers the LN16 and LN32 laser printers, providing the perfect combination of speed and performance for your department, with complete support for Windows®, Windows NT® Novell® and Unix® operating systems, as well as OpenVMS, VAX and AlphaServer environments. They also support TCP/IP, IPX/SPX for Novell NetWare® and EtherTalk® for Macintosh® network protocols.

The new lineup of Compaq laser printers are versatile and affordable and provide fast, quality printing in demanding office and network environments.

The LN32 gives you up to 1200 x 1200 dpi at a blistering 32 pages per minute, and enough input and output options to satisfy the most demanding paper-handling requirements. What's more, you get Adobe® PostScript® Level 3 for the ultimate in providing increased font capacity, graphic definition, and precise representation of complex images.

For network and system administration, the LN32 also includes Remote Control Software – a graphical tool that allows you to monitor and manage not only the LN32, but all of your SNMP printers across a TCP/IP network.

At 17 pages per minute and resolution of up to 2400 x 600 dpi, the LN16 delivers rich blacks, crisp edges, and finely detailed halftones to the most demanding small- to medium-sized workgroups – at a price your CFO will love.



Don't let multiple operating systems short-circuit your network. For rock-solid reliability, superb performance, and low cost of ownership in multiple operating systems, choose new, genuine Compaq laser printers.

New "*Try Before You Buy*" program makes it easy to evaluate any Compaq printer at your site for 15 days. Find out how great these new printers perform.

For details, call 1-800-OK-COMPAQ or visit www.compaq.com

COMPAQ Better Answers.℠

©1999 GENICOM Corporation. DIGITAL and OpenVMS are trademarks of Compaq Computer Corporation. All other company and product names are trademarks or registered trademarks of the their respective companies. GENICOM is a supplier of Compaq Enterprise printer products.

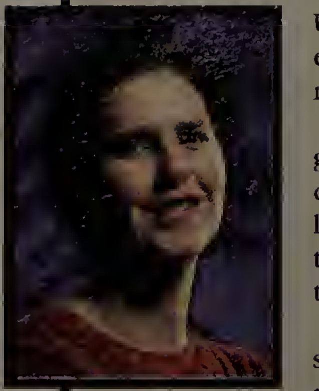
Free Product info enter NWInfoXpress #105 online @ **www.networkworld.com/infoxpress**

Editorial Insights

The NW200: Your guide to the network world

Blink your eyes in this business, and you'd better check to see what you missed in that split second.

Never has that been clearer to me than in pulling together our annual Network World 200 issue, a Signature Series supplement that ranks the top 200 public U.S. network companies and examines the network business in general (page 43).



Keeping tabs on the biggest firms in an incredibly dynamic industry is a challenge indeed. The changes that occur day-to-day are off-the-charts.

Last week, for example, we scrambled to fix a few pesky references to Eckhard Pfeiffer as president and CEO of Compaq and to update information on Qwest Communications, one of the fastest growing NW200 companies. We'd have been remiss not to note that Qwest just got a big boost from BellSouth, which acquired a 10% stake in the carrier and will market its services.

And two weeks ago, in our "Where are they now?" story (page 85), we were set to cite Torrent Networking Technologies and Bright Tiger as two of the five companies on our 1998 10 companies to watch list still actually operating on their own. That was before Ericsson snapped up Torrent, and Allaire bought Bright Tiger.

It's not to soon to wonder if we'll see the same track record for the 10 companies to watch this year. Profiled beginning on page 73, they offer some hot technologies that bigger firms are apt to buy into. I could easily see Network Alchemy getting bought for its virtual private network servers, or Covad Communications snapped up for its digital subscriber line base.

After all, that has become the nature of the network world, and one of the reasons we pulled together a special NW200 package, "And then there was one." Head to our NW200 Fusion minisite (www.nwfusion.com/nw200) for an analysis of the acquisition activity, a debate between executives from Cisco and PSINet on the pros and cons of going it alone or being acquired, and an interactive forum that lets you voice your opinions.

The NW200 rankings, which begin on page 60 and are available in an interactive, downloadable version on the NW200 minisite, provide an extensive analysis of network companies. In the charts, we look at these companies' financials, strategies, cultures, boards and more. We think you'll find the NW200 to be one of the most comprehensive guides to the network business.

—Beth Schultz
bschultz@nww.com

Message Queue

THE REAL VILLAIN

It amazes me that everyone is getting so angry over the Melissa virus and its creator ("Stopping the next Melissa," April 5, page 1). The reality is, this person did everyone a great big favor, although I doubt anyone who had to work over the weekend installing updates and purging documents sees it that way. Nevertheless, instead of purging files, they could have been trying to restore backups and reinstalling Windows operating systems.

The real culprit here is not the person who wrote this macro, but the way in which software vendors are allowing subroutines to be run without the user knowing or fully understanding the ramifications. Most end users have never written or run macros and don't have even a rudimentary understanding of how macros work or why they would want to use them.

Vendors are giving away the keys to the candy store, and we keep going along with it. How much integration do we really need, and what are the risks vs. the benefits?

I think everyone is angry with Melissa's author not for what he did, but because it was so simple. Their egos were hurt because they thought they were ready for anything, and they found out how vulnerable they really are. Next time they may not be so lucky.

John Martoccio
Chicago

LESSONS FROM THE PAST

Regarding David Rohde's column on why regional Bell operating companies should be allowed into long distance ("Telecom competition, Version 1.0," April 5, page 22):

I don't know if Rohde was covering the telecommunications market in 1984 when AT&T divested the RBOCs, but I worked in the industry at the time. The systems were not ready to handle the new relationships between AT&T and the RBOCs. This created a corporate nightmare. Millions and millions of dollars of overcharges went from the RBOCs to AT&T. AT&T had to set up an organization staffed by more than 1,000 people just to verify the bills received from the RBOCs.

We don't want to repeat the mistakes of the past. The systems must be working and reliable before the RBOCs are allowed to enter the long-distance market.

RBOC entry into long distance will come. Let's make the goal high-quality competition, not just any kind of competition.

Bob Flappan
Overland Park, Kan.

Rohde responds: I have no doubt that there will be problems once an RBOC obtains long-distance authority, just as there were in the original AT&T divestiture. My point is that there is no way to work all the technical kinks out of the system in advance of a policy decision. The only way to do that is in the commercial marketplace.

VIVA VMS

Regarding your article "OpenVMS users fear the future" (April 5, page 13):

My company has been a VMS shop since we were founded in the mid-1980s. VMS is a great operating system. We recently rebooted a system that had been up for over 80 days. Our record is more than 120 days. What other operating system has a similar record?

It's a shame that Compaq is so unappreciative of VMS' well-earned reputation and wonderfully rich set of features. The most popular Control-Alt-Delete operating system is but a toy compared with VMS. Yet at times it seems as if Compaq is so eager to embrace NT that the company appears to put Microsoft shareholders and users ahead of its own.

Compaq thinks that VMS shops will naturally migrate over to Unix. Yes, if we can no longer defend staying with VMS, we probably will go to Unix. But we must then decide which Unix it will be. Compaq will be just one of the firms to which we will send the request for proposal.

Ewin Barnett
Executive vice president, systems
Carfax
Columbia, Mo.

Send letters to nwnews@nww.com or John Gallant, editor in chief, Network World, *161 Worcester Road, Framingham, MA 01701. Please include phone number and address for verification.*

More Online
Letters about telecom competition and other topics.
DocFinder
FIND IT ▸ 2621 ON FUSION

Mike Keefe 99
C.E.O.
Warning: You do not have sufficient profits to save this item.
delete
COMPAQ

Management Mode . Jeff Shapiro

THE BATTLE FOR THE DESKTOP OPERATING SYSTEM: ROUND II

In a previous column, I advised readers who are in the process of selecting a corporate desktop operating system to wait for Windows 2000. The same day the column appeared, I began to receive e-mail from readers. About half said, in essence, "What? Are you crazy?" while the other half said, "You got it right, bro." A few more were of the "But what about MacOS/OS2/Linux/MyFavoriteOS?" variety.

Evidently I struck a nerve. Normally we writers take our lumps or kudos and move on to the next topic. That was certainly my intention. However, events intervened.

Specifically, earlier this month Microsoft quietly announced that the next version of Windows, Windows 98 2nd Edition, will not be the product the company had been working toward — one that would have incorporated the best features of Windows 95, 98 and NT. It turns out that it's a lot harder to create an operating system as stable as NT and as compatible as Windows 98. This move strengthens the case I previously made in favor of holding off for Windows 2000.

Let's review the desktop operating system options as they stand today and look at another component of the decision: total cost of ownership (TCO).

Microsoft plans to release Windows 98 2nd Edition later this year. The release will incorporate the current base product, all the known bug fixes to date and a few new utilities to make it attractive to upgrade purchasers. The core technology remains the same, as do the core problems. Poor manageability, difficulty in controlling standardization and security issues all make this operating system a less-than-perfect choice.

Windows 2000 (formerly Windows NT 5.0) is on track. The next release in the family will have the same features as NT 4.0, plus plug-and-play support, complete Universal Serial Bus support and other goodies Windows 98 users take for granted. Backward compatibility will be improved but will still be less than ideal.

Upgrade costs for both products are virtually identical, so that doesn't factor into the TCO decision. However, support costs do. Both Windows 95 and 98 are support-intensive. Even with highly restrictive policy and registry settings, users often cause problems with their computers that can be difficult and time-consuming to rectify. My organization plans for one support visit every three months per desktop.

On the other hand, Windows NT is a lot easier to support. Among other things, it has a native capability to reset the desktop to where it was before the user started messing with it. Policy management is easier, with specific tools provided in the box. We plan one support visit per year for NT desktops.

As for the other operating systems: Linux is cool, but it's a corporate nightmare. OS/2 stays off the map, as it's a niche product for a niche market. Macs enjoy very low TCO with limited support costs, but have limited applicability on the corporate desktop.

As much as we like to bash Microsoft for being big, successful and arrogant, Windows NT/2000 is the platform that makes good business sense for the next three years. Next time: a new topic. Promise.

Shapiro is district technology coordinator for the Kingsport City Schools in Kingsport, Tenn. He can be reached at jshapiro@kpt.k12.tn.us.

Yankee Ingenuity . Howard Anderson

SERVING TWO MASTERS: THE REAL MARKET AND THE STOCK MARKET

What should the network that supports your company's Internet initiative look like? How much should your company be spending? On what should you be spending that money? These all are intelligent questions and deserve answers — especially these days, as one firm after another tries to appear to be a Web company and garner the price earnings multiple that Web companies enjoy.

All CEOs in high tech — hell, all CEOs in America — are asking themselves the same few questions:

"If companies such as Geo Cities are worth $5.2 billion on $19 million in sales and $20 million in losses, how can we Web-enable some of our applications and get a higher multiple? And why aren't we getting credit for all the business we are doing or could be doing on the Web? Why isn't that reflected in our stock price?" That kind of dumb thinking is going to get us all into trouble.

The stock world has arbitrarily divided the universe into two groups. The first group consists of hot "new economy" companies that grow at a rate of 40% per year and are challenging the incumbents by basing their corporate strategies on the Web.

For these exalted five dozen or so companies, which include Amazon.com, E*Trade, Yahoo and Infoseek, the new rules apply. What are these new rules? Grow fast, faster, fastest.

The second group consists of not-hot "old economy" companies that grow at 15% per year and make a profit.

FRANCIS BLAKE

For example, Disney currently is considering merging its Internet initiatives with its 47% ownership in Infoseek and floating a separate company — all because the stock market has not recognized that there is a valuable hot company within the staid Disney corporation.

But it's not just Disney; every CEO in America is thinking the same way!

Look, electronic commerce is going to be big. Every company will need to have a strategy for business-to-business or business-to-consumer e-commerce, and some day every Wall Street analyst will be grading companies on where they stand compared with their competitors in regards to e-commerce.

But what we are now seeing is nothing short of dangerous; we are seeing all sorts of companies compromising their overall corporate strategies in order to appear "e-tractive."

I was in a venture capital meeting last week in which the partners were discussing their portfolio. Some of the investments were doing well, many were below plan — business as usual. Often at these meetings, the partners who represented the dogs are in the hot seat. What are they going to do to get these companies back on plan? Fire the president? Hire a new marketing vice president? Sell the company? Cut expenses? All are proven solutions and some even work.

But the tenor of venture capital meetings has changed. The new question is: "Can't we Web-enable these companies' applications and get some dumb investment banker to take this company public at 20 times sales?" (Not earnings, sales.)

Every product you can buy in a mall or store now has a half-dozen equivalents in cyberspace. Every mall-based company or store has its online equivalent. And every CEO wants it both ways — he wants his company's stock to be valued as if his company were an e-company, and he wants his company's earnings and sales to increase as if it were a traditional company.

But in the end, the e-hype gets us all in trouble. We think that the rules of building networks, of growing business through customer service, of building balance between marketing, production, finance and sales, are in suspension. But they are not.

And companies that try to serve two masters, the real market and the stock market, are going to find that they have failed both.

Anderson is founder and president of The Yankee Group, a consultancy based in Boston. He tries to keep his skepticism from degenerating into rampant cynicism, a battle he appears to be losing. He can be reached at handerson@yankeegroup.com.

While our competition was hunting Melissa, we killed her, skinned her, and made a belt.

IF YOU HATE VIRUSES, IMAGINE HOW WE FEEL—OUR JOB IS DETECTING AND ERADICATING THEM. IT'S SOMETHING WE DO BETTER THAN ANYONE. SO IT'S NO SURPRISE WE WERE THE FIRST TO DISCOVER MELISSA, AND THE FIRST TO PROVIDE OUR CUSTOMERS WITH THE CURE, THROUGH OUR MCAFEE TOTAL VIRUS DEFENSE SUITE. EXPLAINING ONCE AGAIN WHY NETWORK ASSOCIATES IS FIRST WITH THE FORTUNE 500.® TO FIND OUT MORE, CALL 1-800-332-9966, DEPT. 6258, OR VISIT WWW.NAI.COM/MELISSA. AFTER ALL, IT'S PROBABLY THE SAFEST PLACE ON THE INTERNET.

network ASSOCIATES

Who's watching your network

©1999 Network Associates, Inc.

Free Product info enter NWInfoXpress #77 online @ **www.networkworld.com/infoxpress**

NetworkWorld

200 The biggest companies in networking

44 Mixing it up
Revenue growth among the NW200 — the largest network companies in the U.S. — is up 10%, but profits are in the dumps as firms blend in the assets they acquired in 1998.

66 A tale of two regions
East and West Coast companies have corporate cultures that are as different as the physical locations they occupy. How does geography affect a company's culture, policies and — ultimately — its success?

69 The Billion Dollar Club
Some top NW200 companies have stockpiled cash reserves that would make any miser proud. But could they be putting their money to better use?

Cover/illustrations by Patrick Corrigan

73 10 companies to watch
These young companies, pitching hot technologies ranging from digital subscriber line service to Web-based management, could be the network stars of tomorrow.

85 Where are they now?
The race for glory is over for most of the start-ups we profiled as 1998's 10 companies to watch, but a few are still in the running.

88 The board game
Who are the people directing some of the hottest network companies?

93 Signature Sign off
Industry watcher Thomas Nolle shares his view on what would most revolutionize the network business and have the biggest impact on the future of our NW200 companies.

THE Signature SERIES

The Network World 200 is one of six bimonthly special issues providing insights, opinions and information on the biggest trends shaping the networked world. Look for new perspectives on your jobs and careers in the next installment of the Signature Series, You, coming in July.

NW200 Online

Head to our special Fusion minisite (www.nwfusion.com/nw200) for more on the NW200 companies and the network industry in general. Among the attractions, you'll find:

The interactive NW200 database

Dig deeper into the financials of the companies on our 1998 list and run your own cross tabs and comparisons. DocFinder: 2707

Forums

Share your views on:

- Doing business with (or working for) East and West Coast companies. DocFinder: 2702
- What network companies you think bear watching this year. DocFinder: 2703
- Whether the network industry is too acquisitive. DocFinder: 2706

More stories:

Put your money where your modem is
It's no secret that network companies have an affinity for the Internet. But only a few NW200 firms have made selling on the Web a critical undertaking. We delve into the reasons why. DocFinder: 2708

And then there was one
So ends the familiar tale of doing business in the network industry, as the merger and acquisition frenzy continues unabated. Go online for:

- An analysis of the activity. DocFinder: 2705
- A comprehensive chart of acquisitions announced in 1998 and the early months of 1999. DocFinder: 2701
- A Face-off in which Jayshree Ullal, vice president of enterprise marketing at Cisco, and David Kunkel, PSINet's executive vice president, debate whether it's better to be acquired or to go it alone. DocFinder: 2704

Mixing it up

Revenue growth among the Network World 200 — the 200 largest U.S. public network firms — is up 10%, but profits are in the dumps as firms blend in assets to prepare for convergence.

BY JOHN DIX

Recipe for change: Stir in a pinch of excitement about cells and packets. Invert industry, and shake vigorously to break down layering that has set in. Put aside, and let natural blending occur. Despite best efforts, some flotsam may result; skim off and discard.

Welcome to the great homogenization cycle of the network age.

Whether or not you believe in convergence, the fact is, the industry is reshaping itself to brace for change. 1998 will be remembered as the year that many industry segments began to blend, epitomized by Nortel Networks' acquisition of Bay Networks. That deal blurred the line between vendors that sell to enterprise business accounts and those that sell to carriers.

But that was only one of many deals that are making it hard to tell a LAN player from a WAN supplier, a voice provider from a data carrier, a PC maker from a systems house. Boundaries are blurring all around us.

Besides the Nortel/Bay deal, in infrastructure big overseas telecom players scooped up U.S.-based data vendors, and enterprise suppliers scrambled to become carrier equipment providers.

In computers, the landscape changed dramatically when Compaq purchased Digital, merging the biggest PC player with the biggest minicomputer maker. Now more than ever a system is just a server. How much power do you need?

HOT GROWTH COMPANIES

Fastest growing companies 1997-1998

1998 rank	Company	Revenue $M 1997	1998	1997-1998 % Δ
169	Exodus	12	53	325
105	WinStar	71	244	243
46	Qwest	697	2,243	222
125	World Access	49	152	213
108	Yahoo	70	203	189
75	Intermedia Communications	248	713	188
124	Excite	54	154	185
182	Internet Security Systems	14	36	167
122	E.spire Communications	59	157	166
180	BroadBand Technologies	15	39	160
165	Lycos	22	56	155
176	FVC.com	19	44	136
147	Infoseek	35	81	134
77	McLeodUSA	268	604	125
115	Earthlink	79	176	122

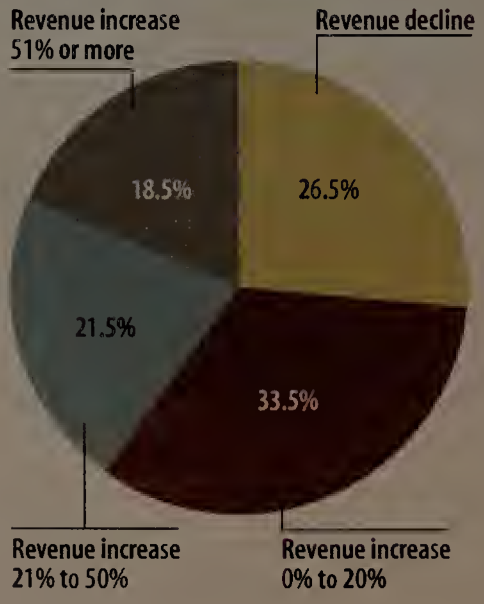
Fastest growing companies 1993-1998

1998 rank	Company	Revenue $M 1993	1998	1993-1998 CAGR*
77	McLeodUSA	1.5	604	232%
72	BMC Software	2.4	730	214%
52	Ascend	16.2	1,479	147%
75	Intermedia Communications	8.0	713	145%
85	FORE Systems	5.5	458	142%
40	America Online	40.0	2,600	130%
134	Documentum	2.0	124	128%
104	Citrix Systems	5.2	249	117%
99	MRV Communications	7.0	264	107%
46	Qwest	69.0	2,243	101%
101	PSINet	8.7	260	97%
140	Premisys Communications	3.5	102	96%
119	Visio	7.0	166	88%
105	WinStar	11.2	244	85%
121	Remedy	8.0	157	81%

*Compound annual growth rate

REVENUE BAROMETER

Share of NW200 companies that saw . . .



Although revenue growth for the NW200 was generally healthy, some 79 companies reported a net loss last year compared to 66 in 1997.

In telecommunications, major long haulers continued to break into local markets, the most notable events of 1998 being AT&T's acquisitions of competitive local exchange carrier (CLEC) Teleport Communications and cable TV provider Tele-Communications, Inc. (TCI). The local telcos are itching to fight back and merging like crazy — witness the SBC Communications/Ameritech deal — to build mass as they wait for the regulatory green light to offer long distance. (Gearing up for that, BellSouth just acquired a 10% share in Qwest.)

And of course, all the carriers, computer makers and infrastructure suppliers are chanting the convergence mantra.

Indeed, convergence mania is driving everything from cable TV mergers (the recent deal between Comcast and MediaOne) to AT&T decision-making (the telecom giant says 1999 will be the last year it installs any circuit switches).

IP, in particular, is viewed as the great emulsifier capable of breaking down boundaries between things such as LANs and WANs, voice and data.

But for all of last year's excitement about convergence and the resultant deal-making, revenue for the NW200 as a whole was only up 10%, a few tenths of a percentage point above revenue growth in 1997. While not outstanding, that is an amazing 6% more than last year's revenue growth of the Fortune 500.

Like the Fortune 500, though, profits for the group were down 2%, compared with NW200 profit growth of 8.5% from 1996 to 1997 (overall profits for the Fortune 500 were down 1.8% last year, excluding a one-time gain by Ford Motor).

A quick look at the NW200 chart explains away the profit plunge: Many companies took tremendous charges against earnings as the result of acquisition costs.

Compaq's takeover of Digital, for example, helped push Compaq's revenue up 27% to $31.2 billion, but it also resulted in a loss of $2.7 billion for the year. With the acquisition of Bay, Nortel's revenue jumped 14% to $17.6 bil-

PRODUCTIVITY

Companies with the most revenue per employee in 1998

1998 rank	Company	Revenue per employee in 1998
149	Apex PC Solutions	$1,085,714
43	SAP America	903,101
109	Centron DPL	789,474
19	Dell	770,438
28	Apple	614,819
21	Cisco	578,404
17	Microsoft	535,354
141	Transaction Network Services	525,773
52	Ascend	493,000
161	D-Link Systems	484,375
2	AT&T	483,845
5	Compaq	441,081
130	Prodigy Communications	434,824
34	EMC	422,766
30	3Com	419,505

lion, but the company finished the year with a loss of $537 million.

Other red blotches that dragged the NW200 profit column down can be attributed to heavy investment. Long-haul carrier Qwest, for example, saw revenue jump 222% to $2.2 billion, but the company is spending so heavily it posted a loss of $844 million for the year.

In fact, it may come as a surprise that 79 of the NW200 companies posted losses in 1998. Surprising because these are, after all, the 200 largest public U.S. companies in the market. Roughly 70% of the companies reporting losses, however, are in the second 100 — smaller firms that are still trying to make their mark.

More ominous than profit dips is slipping revenue. A quarter of the NW200 — some 51 companies — saw revenue decline in 1998 (see graphic, page 44). Twenty-one of these companies are in the top 100, with the bulk being below the fold. Theories for the softness range from the Internet reordering market priorities to the Year 2000 Bug delaying capital expenditures.

For all of that, there is more good news than bad on the revenue front. One-third of the NW200 saw sales climb at rates up to 20%, while one-fifth grew at 21% to 50%. Another fifth saw revenue grow more than 51%.

Fastest growing of all was Exodus Communications, a Web hosting start-up that saw sales explode 325% last year under the direction of Ellen Hancock, a 29-year IBM veteran. At IBM, Hancock rose to senior vice president of the Networking Hardware and Software divisions.

Accompanying Exodus on the list of the 15 fastest growing companies are six other Internet companies. But new world telecom players are also well represented. Second to Exodus is WinStar Communications, which is building an international broadband network (see story, page 54). And WinStar is accompanied by telecom upstarts E.spire Communications, Qwest and McLeodUSA.

E.spire was the fastest growing NW200 company last year. In fact, five companies — Yahoo, Intermedia, Excite, E.spire and FVC.com — were on this list last year. That's pretty impressive because it means these companies grew *at least* 100% two years in a row.

Of course, at the other end of the spectrum are those companies experiencing the greatest revenue declines (see graphic, page 56). The company heading that list is ON Technology, whose revenue was down 52% from 1997.

The numbers for ON Technology, which makes desktop management tools and the popular Meeting Maker cross-platform calendaring product, look better after adjusting for product lines that were sold off or discontinued last year. Then the company only shows a revenue dip of 9%.

The list of struggling companies is new for the NW200 this year, as is our decision to focus strictly on public companies. We gave up on private firms because they are loath to share their numbers, and, when they do, we have no means to verify the data.

Also different this year is the decision to add three new types of information to the main NW200 chart (page 60): profit margins; the amount of money companies have in cash and short-term investments; and the amount of revenue generated per employee. All three items can be of help in determining a company's health.

Regarding cash and short-term investments, it is interesting to note that Microsoft is sitting on a horde — $13.9 billion — that is nearly equivalent to what it had in sales last year — $14.5 billion (see "The Billion Dollar Club," page 69).

SECTOR BY SECTOR

While the industry blending makes it harder to do a sector-by-sector analysis of 1998 developments — is Nortel a carrier supplier or an enterprise player now? — things are not so finely pureed as to render such an exercise meaningless.

In enterprise infrastructure, Cisco continues to be the benchmark against which others are measured.

Revenue was up 32% by the time the behemoth closed the books on fiscal 1998 last July, growth fired in the main by strong enterprise and carrier sales. Profits were up a comparable percentage to $1.9 billion. Some enterprise infrastructure companies saw larger percentage gains, but none grew as much. After all, that 31% hike added $2 billion to

Continued on page 48

WINDOWS® 20

Microsoft Windows NT Workstation 4.0 is now available with Service Pack 4, which includes Y2K and Euro updates. For Year 2000 information regarding Microsoft products see www.microsoft.com/year2000/.

©1998 Microsoft Corporation. All rights reserved. Microsoft, Windows, the Windows logo, Windows NT and Where do you want to go today? are either registered trademarks or trademarks
of Microsoft Corporation in the United States and/or other countries.

You know changes are coming.
Shouldn't your PCs know it too?

00 *READY* PCs

If you buy a new PC now, it should be ready to run the next-generation desktop OS, Microsoft® Windows® 2000 Professional. Well that's the whole idea behind **WINDOWS 2000 *READY* PCs**. They've got the RAM. They've got the power. And they've got Windows NT® Workstation 4.0 (including Y2K updates)—which means you've got performance, reliability, and low support costs now, plus the easiest possible upgrade path when the time comes. So with one decision, you're cleverly preparing your desktops for the future. For information on hardware partners and products, please visit our Web site.

READY **WITH WINDOWS NT® WORKSTATION 4.0**
READY **WITH 300 MHz OR MORE**
READY **WITH 64 MB OF RAM OR MORE**

www.microsoft.com/WINDOWS2000/*READY*/

Microsoft®
Where do you want to go today?℠

Cash cow

Check Point Software reaps the most profits from revenue.

What's the key to running a profitable business?

We asked Check Point Software, which last year earned a whopping 49% return on revenue, landing it atop the list of the most profitable Network World 200 companies (see graphic, page 53).

Asheem Chandna, vice president of marketing and business development at Check Point, which sells firewall and other enterprise network security products, chalks up the company's success to three things:

- A leveraged sales model. Check Point sells through a large base of partners, including OEMs, distributors and managed service providers. That gives the company broad reach and the ability to scale quickly without the associated cost of maintaining a direct sales force.
- Innovative technology. "We came late to the firewall market in 1993," Chandna says. "There were already several other vendors, but we came out with innovative technology and basically provided the best price/performance. It is key to have innovative technology and market-leading products."
- A fast growing market segment. "We are fortunate to be in a high-growth market," Chandna says. "Security has become a must-have vs. a nice-to-have technology."

Asked if profitability is a corporate goal, Chandna says Check Point focuses on growing revenue and delivering high-quality products. Profitability is a byproduct.

Some of the profits go back into the product. Chandna says the company's research and development group is the fastest growing business unit. Last year, Check Point spent 7% on R&D. That figure is respectable, but not enough for Check Point to make the NW200 list of companies spending the most on R&D.

"Even as profitable as we are, we still spend money carefully," Chandna says.

— John Dix

Check Point's Vice President of Marketing and Business Development Asheem Chandna spells out three rules for success.

JASON GROW

Continued from page 45

Cisco's revenue column. That's the equivalent of bolting on one and a half Cabletrons.

The stock market has rewarded Cisco handsomely for its performance. In fact, Cisco President and CEO John Chambers loves to show a slide displaying how the market capitalization of Cisco — now roughly $155 billion — is greater than the combined market capitalization of his top 10 competitors. That looks impressive, but it is a half-truth. He's not including the likes of Lucent, Ascend or Nortel in that total, even though the company clearly views them as competitors.

The companies that made up the once mighty troika that competed head to head with Cisco — 3Com, Cabletron and Bay Networks — are, in a word, struggling.

INVESTING IN THE FUTURE

Companies that spend the most on R&D

1998 rank	Company	R&D as % of 1998 revenue
158	RealNetworks	49%
180	BroadBand Technologies	49%
196	Spyglass	45%
179	Verity	40%
187	Network Peripherals	39%
200	Vertel	39%
185	Interlink Computer Sciences	38%
160	Open Market	37%
177	Cylink	37%
192	Sync Research	30%
166	ACT Networks	30%
191	Artisoft	29%
189	Netopia	28%
153	NetManage	26%
195	Tangram Enterprise Solutions	26%

3Com's revenue slipped 3% last year to $5.4 billion, and the company posted a paltry $30 million in profits. The latter reflects one-time charges associated with the U.S. Robotics acquisition, a deal that was finalized in the first quarter of fiscal 1998. If you exclude those charges, pro forma net income was a respectable $543 million, a 10% profit margin.

Nonetheless, when the U.S. Robotics merger was announced, it was defined as a pooling of interests and the deal was valued at about $6.6 billion. That was either overly optimistic or the company still has a ways to go to get back to where it started.

Surprisingly, 3Com is struggling most in its core market. Sales of client access products — network interface cards and modems — were down 8% to $2.9 billion. Sales of system products — hubs, switches, routers and the like — were up 3% to $2.5 billion. 3Com says the PalmPilot is its fastest growing product line.

Cabletron also saw revenue dip last year, a 2% step backward that left the company with $1.38 billion in sales and a loss of $127 million. If you back out charges associated with the acquisition of Digital's Network Products Group and charges for a corporate reorganization, net income would have come in at $130 million in 1998.

Due to the company's odd fiscal year, which ends in late February, Cabletron has already closed the books on 1999. And at least this time around revenue is moving in the right direction, inching up 2% to $1.41 billion. Losses, however, are mounting. The company posted a loss of $239 million for 1999. And even backing out special charges for acquisitions — NetVantage, FlowPoint, YAGO Systems, and the digital subscriber line access multiplexer division of Ariel — still leaves a loss of $7.1 million.

Cabletron Chairman and CEO Craig Benson has his work cut out for him.

Things at Bay are harder to account for considering it was swallowed by Nortel. Suffice it to say that, while Bay improved under the direction of new CEO David House, it was clear that teaming with a larger player was a smart long-term move.

GLOBAL ECONOMY

Leaders in overseas sales

1998 rank	Company	Percentage of revenue from overseas sales
126	Datapoint	97%
123	Standard Microsystems	71%
76	Comverse Technology	65%
166	ACT Networks	64%
198	Develcon Electronics	58%
107	Boole & Babbage	58%
106	Progress Software	57%
102	Hypercom	57%
23	Unisys	57%
168	Centura Software	56%
10	Intel	55%
67	Mitel	55%
3	Hewlett-Packard	54%
190	Unify	54%
5	Compaq	53%

It will be interesting to see if Cabletron comes to a similar conclusion this year. It's fairly easy to imagine one of the huge overseas telecom powerhouses, such as Alcatel, swooping in on Cabletron. Alcatel, after all, recently acquired gigabit network player Packet Engines, as well as Xylan, the fast growing provider of local network products.

It is more of a stretch imagining Cabletron fitting into the plans of the other acquisitive European superpower, Siemens AG. Just last month, Siemens formed a U.S. company, called Unisphere Solutions, to chase IP dollars.

Unisphere Solutions, which is said to represent an initial $1 billion investment by Siemens, will combine existing units of Siemens Information and Communication Networks U.S. with the newly acquired assets of Argon Networks (which makes an integrated IP routing/ATM switching platform) and Castle Networks (which makes central office gear that bridges circuit and packet environments). The company has also taken an equity stake in Accelerated Networks (a provider of integrated access tools).

Analyzing the acquisitions of the overseas giants, it is clear Siemens is looking primarily at the carrier market, whereas Alcatel is trying to bolster its enterprise portfolio.

In that regard, Siemens' strategy is similar to Lucent's, and Alcatel's is closer to Nortel's. Lucent, after all, is acquiring Ascend to strengthen its position in ATM/IP carrier-class equipment, while Nortel's Bay acquisition gave it entry to enterprise accounts.

VALUE PACKED

Highest valued companies

1998 rank	Company	Market capitalization* in billions
17	Microsoft	389
10	Intel	193
1	IBM	162
21	Cisco	155
6	MCI WorldCom	152
2	AT&T	148
7	Lucent	137
19	Dell	107
9	SBC Communications	100
12	BellSouth	89
4	Bell Atlantic	85
40	America Online	81
3	Hewlett-Packard	69
14	Ameritech	67
11	GTE	61

* Value of outstanding stock as of March 5, 1999

And, believe it or not, the relative small fry that has all these giants running scared and seeking partners is none other than Cisco. The justifiable fear is that all the circuit-switched carriers now beginning to chant about cells and packets will turn to Cisco when it comes time to upgrade their infrastructures.

And chanting they are. As noted, AT&T recently announced it will stop buying circuit-switched central office gear by year-end. And MCI WorldCom, Sprint, Qwest and the rest are all talking up a future based on ATM and IP.

NEW RELIGION

But while all the circuit-switched carriers were doing the public packet prance last year, they were really preoccupied with their metropolitan network stories. AT&T made the biggest waves with its acquisitions of Teleport (the $11 billion deal completed in July), and TCI (the $48 billion deal approved in February).

AT&T finished the year with revenue up 3% to $53 billion and profits of $6.4 billion. Now comes the hard part: integrating the resources and upgrading the cable TV plant.

MCI WorldCom, of course, has a multifaceted local presence. MCI was already building metropolitan networks when it merged with WorldCom, and WorldCom already owned MFS, a facilities-based CLEC, and Brooks Fiber, another CLEC.

In fact, local voice is MCI WorldCom's single fastest growing business in terms of revenue, growing 80% last year to $358 million. By comparison, long-distance voice sales were up 9% last year to $19 billion; long-haul data was up 28% to $5.8 billion; Internet revenue was up 69% to $2.2 billion; and revenue from international services was up 56% to $1.1 billion.

The company closed the year with total revenue up 15% to $30.4 billion and profits of $1 billion. Like all the other companies growing through acquisition, these profits are artificially depressed by extraordinary charges.

An interesting side note: Despite the fact that AT&T generates $20 billion more revenue than MCI WorldCom, the stock market puts a higher value on the folks from Mississippi. Last month, MCI WorldCom's market capitalization was $152 billion vs. AT&T's $148 billion. That will give MCI WorldCom President and CEO Bernard Ebbers more ammunition for his acquisition gun.

Sprint, of course, has had a strong local presence ever since it merged with local carrier Centel in 1993. It was not until last year, however, that Sprint's

Continued on page 51

WORLDWIDE LEADER IN SECURE ENTERPRISE NETWORKING

Know Exactly Who's Doing a Number on Your Network.

Fred in Marketing
"Power User." Merciless tweaking kills entire subnets.
192.168.91.152

Al in Accounting
Steals bandwidth to feed streaming audio habit.
192.168.35.101

Sid in Delivery
Hacker-in-training practices on your routers.
192.168.74.165

Marci in Sales
Constantly on the run; changes address daily.
192.168.219.88

Control Security by Name and Number with Meta IP™ User-to-Address Mapping™

What users do to your network can be downright criminal. You can positively identify the culprits with Meta IP and its unique User-to-Address Mapping service. UAM correlates dynamic address assignments with Windows NT and Novell login names. So instead of 192.168.253.100 causing a problem, you'll know right away it's Alice in HR.

But Meta IP doesn't just solve problems. It prevents them, by automating IP addressing and naming across large, multi-site networks. Meta IP integrates DNS and DHCP, synchronizes them via dynamic DNS updates, and lets you manage all its services through a common interface. You can extend automated, reliable addressing to every node, without sacrificing user accountability.

In fact, Meta IP can make your entire network more secure, through its integration with Check Point FireWall-1® and VPN-1™. It lets you implement security policies for dynamically addressed users. You get the convenience of DHCP, and your users get a single sign-on solution.

With Meta IP, your users will stray less often. And when they do, you'll be able to quickly mend the error of their ways.

Download our free demo and investigate Meta IP for yourself. Call 1-800-META-463 or visit www.metaipcheckpoint.com.

- Network Security
- Traffic Control
- IP Address Management
- OPSEC Alliance
- Integrated Policy Management

CHECK POINT™
Software Technologies Ltd.

©1999 Check Point Software Technologies Ltd. All rights reserved. Check Point, the Check Point logo, FireWall-1, VPN-1, Meta IP and User-to-Address Mapping are trademarks or registered trademarks of Check Point Software Technologies Ltd. or its affiliates. All other product names mentioned herein are trademarks or registered trademarks of their respective owners. The products described in this document are protected by U.S. Patent No. 5,606,668 and 5,835,726 and may be protected by other U.S. Patents, foreign patents, or pending applications.

Free Product info enter NWInfoXpress #76 online @ www.networkworld.com/infoxpress

IF YOUR BUSINESS' NEEDS EXCEED
THAT OF YOUR INTERNET SERVICE, THERE ARE
ALWAYS OTHER WAYS OF COMMUNICATING.

If you sometimes feel that your Internet service is taking you for a rough ride, it's time you found a provider with the capacity you need, like UUNET,® an MCI WorldCom℠ Company. We know you depend on the Internet to communicate with customers and business partners more each day. That's why we built the world's highest capacity, most expansive and reliable IP network, so you can depend on the Internet to do business. Businesses in over 70 countries and six continents depend on us. You should too, because we're the provider you'll never outgrow. So call 1 800 465 7107 or visit us at www.info.uu.net. UUNET. We'll guarantee you thoroughbred service from a real workhorse.

UUNET
An MCI WorldCom Company

THE WORLD'S INTERNET COMMUNICATIONS COMPANY

U.S : +703 206 [illegible] Canada: 1 888 242 0653 © 1999 UUNET Technologies, Inc., a subsidiary of MCI WorldCom, Inc. All rights reserved The UUNET logo is a trademark

Continued from page 49

local arm started selling the complete Sprint portfolio of products and services. Sprint's local telco revenue reached $5.33 billion last year, one-third of the company's $16 billion in sales. (Sprint's PCS wireless group is accounted for separately, has its own stock and shows up separately on the NW200 list. In comparison, PCS brought $1.23 billion in the door and lost $2.4 million.)

Oddly enough, Qwest, the fast growing company whose vision of an integrated packet future set the industry on its ear last year, is thumbing its nose at facilities-based metropolitan networks, favoring instead to pursue deals with the RBOCs. To date, those efforts have run afoul of regulatory restrictions, although the investment by BellSouth could prove interesting.

EMPLOYEE BOOM

Companies adding employees fastest 1997 - 1998

1998 rank	Company	Employees '97 - '98 % Δ
46	Qwest	400%
147	Infoseek	278%
165	Lycos	233%
108	Yahoo	173%
182	Internet Security Systems	148%
5	Compaq	117%
48	Wang Global	110%
104	Citrix Systems	106%
176	FVC.com	106%
159	Peregrine Systems	94%
75	Intermedia Communications	93%
133	Hummingbird Communications	84%
72	BMC Software	83%
134	Documentum	75%
143	Brooktrout Technology	73%
128	Nextlink	73%

The biggest news on the RBOC front last year was just more of the same: megamergers. After swallowing NYNEX in 1997, Bell Atlantic in July moved to scoop up GTE in a stock deal valued at $53 billion (the merger is still pending). And after buying Pacific Telesis, last year SBC moved to acquire Ameritech for $62 billion, another deal that is still pending.

While there were eight major regional telco companies a few years ago — seven Bell holding companies and GTE — ultimately only four will remain. Four big ones, at that. Combining a $31 billion Bell Atlantic with a $25 billion GTE will create a company that rivals the size of $53 billion AT&T. The newly wed SBC and Ameritech should weigh in with revenue of around $45 billion.

The stakes are changing dramatically.

THE SOFT SIDE

Even with the promise of dramatic change in telecom and Wall Street-savvy leaders like Ebbers and AT&T CEO C. Michael Armstrong leading the charge, the street still puts a higher value on companies like Microsoft.

If you add up the revenue of AT&T, MCI WorldCom, Sprint and Qwest, you come up with a whopping $102 billion, equivalent to the GDP of Finland. Their combined market capitalization is a respectable $349 billion.

But that's $39 billion less than the market capilization — $388 billion — of Microsoft, a company with $14.5 billion in revenue last year. Apparently, the trick to winning the stock game is to have a great position and keep growing like gangbusters. Microsoft revenue jumped 28% last year, and profits leaped 30% to $4.5 billion.

In fact, it was a good year for many of the software players: Oracle's revenue was up 26%, Computer Associates' was up 17%, Platinum Technology's (acquired in March 1999 by CA) was up 55%, and Sterling Software's was up 26%.

Even Novell bounced back, pushing revenue up 8% to just more than $1 billion and posting $102 million in profits. Clearly, CEO Eric Schmidt's recipe for recovery is working.

MORE ONLINE: Executives from Cisco and PSINet face off on the issue of industry convergence. Is it better to go it alone or to merge efforts? Read their views and share your opinions online at our NW200 minisite, DocFinder: 2704.

www.nwfusion.com/nw200

When it comes to network printing, Lantronix has all the answers. Our complete line of print servers includes advanced features such as multi-protocol support and web-based remote management. Plus, our newest models offer a wide variety of options including Fast Ethernet, multiple network interfaces and even internal power supplies. Our single, multi-port and direct-attach models fulfill virtually every network requirement. And since all of our print servers are easy to install and maintain, Lantronix helps you take the work out of network printing.

Visit our website for more information on our family of print servers, or to download our latest Ethernet tutorial.

www.lantronix.com

Free Product info enter NWInfoXpress #42 online @ www.networkworld.com/infoxpress

Selling sizzle

Qwest uses its cachet to lure employees.

The employee ranks at Qwest exploded 400% last year, landing the upstart carrier at the top of the Network World 200 list of companies that are adding employees the fastest.

How do you find and hire 5,800 employees in this tight job market? To hear Joe Weiner tell it, you simply throw open the doors. People relish the opportunity to join a focused, fast-moving company that has a sexy vision, top-notch talent and a whole lot of buzz going for it.

OK. It's not quite that easy, he admits. As director of employment and staffing, Weiner says there is a lot of competition for talent. But he quickly adds that he has never worked for a company like Qwest.

"Good people want to work at a company that has exciting, cutting-edge technology to work on, and they want to work with internationally recognized experts in their field," Weiner says. Qwest offers both.

Weiner says Qwest's best recruiting tool is an employee referral program. Employees can earn up to $4,000 for helping bring someone in at a senior technical level. "Last year, we brought in 700 people and paid out just under $900,000 in bonuses," Weiner says. "It's the most effective program we have."

But Qwest doesn't stop there. With the backing of Barbara Brannen, vice president of human resources, Weiner has built a 41-person recruiting team, 95% of whom have worked directly for recruitment agencies.

"We have an aggressive recruitment plan in place that allows us to infiltrate our competitors and, quite frankly, bring the best and brightest to work here," Weiner says. "We have totally blown the doors off our cost per hire. We are well under industry averages."

In fact, Weiner's group has been successful at luring entire teams away from competitors.

Qwest's Human Resources Vice President Barbara Brannen and Joe Weiner, director of employment and staffing, lure top-notch talent.

DIANE HUNTRESS

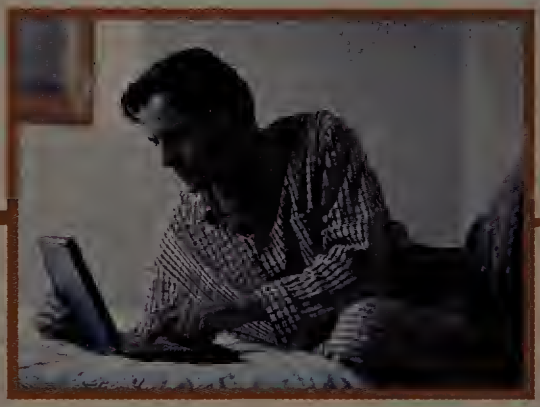
"We pulled over a team of 15 IP network engineers from Sprint," Weiner says. "We started at the top with the director, selling him on the vision of the company with a lot of help from senior management, including [Chairman and CEO] Joe Nacchio. Once we pulled him in, selling the vision to the other 14 folks was fairly easy."

The company backs up the sizzle with competitive pay, and for many tech hires, a stock option plan.

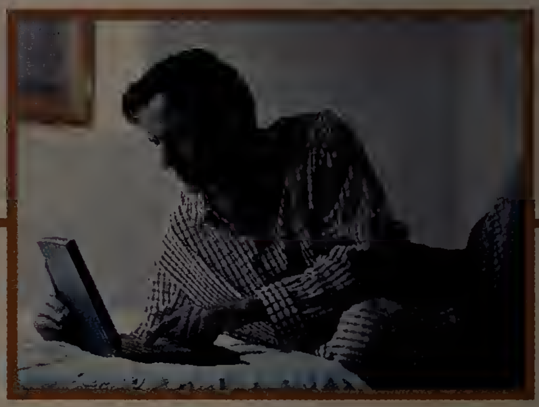
Asked if Qwest's Denver headquarters makes hiring more challenging, Brennan says the city is becoming something of a technical Mecca. "There are lots of new businesses in town, which is good and bad. It ends up creating more competition for the technical people attracted to the city."

In fact Level 3, a carrier that preaches an IP-everything story like Qwest, is scheduled to relocate to Denver this summer.

— John Dix



This IT manager is monitoring capacity in Chicago.



This IT manager is paying bills for Dallas.

You can now manage all of your data and voice communications over the Internet. With MCI WorldCom Interact,℠ real-time traffic monitoring and routing, electronic billing, and secure online payments, among other options, are literally a mouse click away. MCI WorldCom Interact allows you to manage our unsurpassed voice and data services from wherever you are, whenever your business

The names, logos, and tag lines identifying MCI WorldCom's products and services are proprietary marks of MCI WORLDCOM, Inc. or its subsidiaries. MCI WorldCom is traded on NASDAQ under WCOM. For more information on MCI WorldCom, visit our Web sites at mciworldcom.com and wcom.com. © 1999, MCI WORLDCOM, Inc. All Rights Reserved

Life on the systems side of the aisle was a little less sure last year. Compaq, Dell, Gateway, Hewlett-Packard and Sun squeezed double-digit growth out of the market, while companies such as Data General, NCR, Sequent and Silicon Graphics saw revenue decline.

The two biggest computer makers, IBM and HP, grew sales 4% and 10%, respectively, but HP profits declined 6% for the year. In reaction to that, CEO Lewis Platt took the radical step of splitting the company in two, separating the computer and network operations from the testing and instrumentation business, which will be renamed.

With Compaq having blended into a soup-to-nuts systems house by acquiring Tandem and Digital, it is hard to compare how it fared last year against pure PC rivals Dell and Gateway. As noted, Compaq's revenue jumped 27% to $31.2 billion last year.

Although a distant second with revenue of $12.3 billion, Dell is coming on strong: Sales were up 59% last year. And the fastest growing segment for the company is sales of servers and other equipment into enterprises, traditionally Compaq's stronghold.

It will be interesting to see if Dell can keep up, especially as Compaq integrates Digital's massive service organization and pitches a complete managed desktop story. Compaq's ability to pull that off is now up in the air, of course, with the recent dismissal of CEO Eckhard Pfieffer.

Continued on page 56

MANAGING PROFITS

Most profitable companies in 1998

1998 rank	Company	Profit as % of 1998 revenue
127	Check Point Software	49%
200	Vertel	39%
132	Whittaker	37%
17	Microsoft	31%
32	Computer Associates	25%
108	Yahoo	25%
49	Tellabs	24%
10	Intel	23%
178	Concord Communications	23%
72	BMC Software	23%
21	Cisco	22%
114	Tekelec	22%
133	Hummingbird Communications	21%
149	Apex PC Solutions	21%
34	EMC	20%

Largest increase in profits 1997-1998

1998 rank	Company	1997-1998 %∆
178	Concord Communications	6,847%
175	Proxim	4,600%
27	NCR	1,643%
39	Frontier	453%
103	Software AG	313%
79	Symantec	227%
76	Comverse Technology	223%
120	Wall Data	218%
22	Gateway	218%
107	Boole & Babbage	172%
35	Qualcomm	164%
67	Mitel	142%
9	SBC Communications	140%
119	Visio	105%
164	Mobius Management Systems	92%

Largest increase in profits from 1993-1998

1998 rank	Company	1993-1998 CAGR*
85	FORE Systems	159%
67	Mitel	98%
16	Sprint (FON Group)	95%
144	Davox	86%
40	America Online	85%
107	Boole & Babbage	81%
164	Mobius Management Systems	73%
117	Security Dynamics	71%
49	Tellabs	66%
121	Remedy	62%
137	Procom Technology	61%
21	Cisco	61%
132	Whittaker	46%
34	EMC	44%
100	Level One Communications	44%

*Compound annual growth rate

This IT manager is
rerouting calls from Boston to Phoenix.

MCI WORLDCOM℠

INTERACT

NETWORK MANAGEMENT
TRAFFIC MONITORING
ELECTRONIC BILLING

demands. In fact, no other Internet tool offers more control over your network.

To learn why MCI WorldCom Interact was named the best Internet/Intranet product

at the ComNet '99 Conference, visit our Web site at www.wcom.com

Free Product info enter NWInfoXpress #75 online @ www.networkworld.com/infoxpress

Highfliers

Exodus and WinStar top the charts as the fastest growing Network World 200 companies

It should come as no surprise that the two fastest growing NW200 companies hail from two of the most dynamic industry segments: the Internet and new world telecom.

Web hosting provider Exodus Communications earned top seed by growing a whopping 325% last year to $53 million, while broadband carrier WinStar Communications came in second by ratcheting revenue up 243% to $244 million.

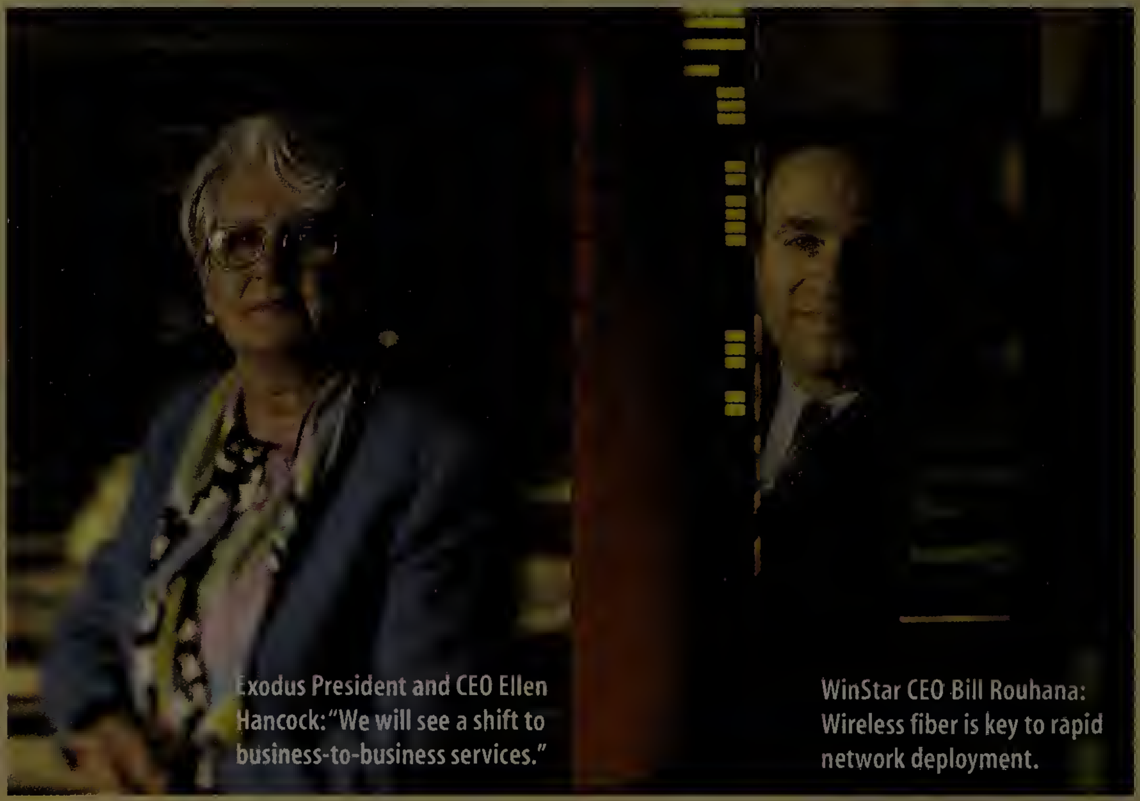
Seven-year-old Exodus started as a computer consulting firm, then in 1995 remade itself into a server hosting and Internet connectivity company. A year later, it rolled those experiences together and created what it called Internet Data Centers, and in 1997 began offering managed services from the centers.

Today, Exodus has seven Internet Data Centers and four more on the drawing board. Customers' Web servers — some of them protected by biometric security, alarm systems and video surveillance — sit behind secured access routers that are connected to the Internet via multiple ISPs. Not only does this help protect the servers and safeguard against service outages, it puts the servers closer to public and private Internet exchange points.

But Exodus wants to be more than a collocation service provider. It wants to push into application hosting and managed services. "This year will be pivotal for the Internet and outsourcing services," says Ellen Hancock, a 29-year IBM veteran who in March 1998 joined Exodus as president and CEO. "We will see a shift from business-to-consumer to business-to-business services."

Managed services accounted for about 10% of Exodus' $53 million in 1998 revenue, says Steve Murry, research manager at International Data Corp. in Framingham, Mass. Exodus hopes to double its managed services revenue to about $10 million this year.

To help meet its goals, Hancock took the company public last year and acquired some key assets, such as Arca Systems, a security analysis firm. Arca provides consulting services that involve everything from developing security policies to providing intrusion detection and monitoring services.



Exodus President and CEO Ellen Hancock: "We will see a shift to business-to-business services."

WinStar CEO Bill Rouhana: Wireless fiber is key to rapid network deployment.

JASON GROW

STEVE SKOLL

And late last year Exodus struck a deal with Corio, an application hosting service provider, to sell access to PeopleSoft applications running in Exodus' data centers.

Exodus also moved to bolster its Web hosting business with the acquisition of American Information Systems. Exodus will turn the American offering into a fully managed service based on Exodus-owned and operated Web servers. Most of the Web sites will be hosted in Exodus' new Chicago data center, which is expected to open this quarter.

While Exodus has a solid plan, it is competing with heavyweights such as Intermedia Digex, Frontier Global Center, IBM Global Services (which is being acquired by AT&T) and GTE Internetworking's Genuity Web hosting division.

To keep pace, the company is bolstering its infrastructure, buying four 622M bit/sec OC-12 connections from Qwest to link its data centers, Hancock says. One of four pipes is already turned on, and the other three are expected to follow soon.

Turning up high-speed network links is a business WinStar has perfected.

The company's secret is using broadband wireless technology, what the company calls "wireless fiber," to overcome the thorny last-mile problem. While the term wireless fiber may be something of a stretch, the technology is enabling WinStar to speed the construction of a nationwide broadband network.

And its efforts seem to be paying off. Today, WinStar has 15,000 customers, 300,000 lines installed and access rights to 4,200 buildings. By the end of next year, the company anticipates supporting 8,000 buildings, says Bill Rouhana, founder and CEO of the New York-based carrier.

Rouhana started WinStar in 1993, leaving behind a 10-year career as a merchant banker. As a financier he funded entertainment and media companies, and in the late 1980s got involved with telecom concerns. It was that exposure that hooked him. "I saw that information and computer technology and the broadband networks were going to have to come together," Rouhana says.

The key to success, he believed, was widespread availability. That meant being able to install the network fast and at reasonable cost. Ultimately, it became clear that the only way to do that was to use some kind of wireless technology to avoid the expense and delay involved with digging up concrete to install last-mile broadband fiber links. In February 1994, WinStar purchased the answer: a license for radio frequencies in the 38-GHz range.

Now, five years later, WinStar is up in 30 major markets in the U.S. and a few cities overseas. By the end of next year, the company anticipates serving 60 domestic markets and, by 2004, the top 50 international markets, as well.

Domestically, the company has a nationwide fiber backbone that links switch locations in major markets. Each of those core switching centers houses a Lucent Class 5 central office switch and Internet, frame-relay and ATM gear.

The switching centers are, in turn, linked to WinStar hub sites around each city via fiber procured from local companies. The hubs are connected to buildings using wireless fiber. Customer traffic can be frame, cell, circuit or a combination.

Rouhana says each wireless channel can support up to 255M bit/sec, and in many places WinStar has up to 19 channels. "So in some places we could amalgamate 4G bit/sec into a building if we needed to," he says.

More typically, the company installs 45M bit/sec wireless links into a building, an installation that takes a few hours, instead of months, for fiber, and costs about a tenth as much.

"Our average customer uses about 20 lines, and that typically covers the cost of adding the building to the network from a capital point of view," Rouhana says. "So you can add a lot of buildings knowing you're going to recover your capital very quickly. Then you have lots of excess capacity left over. If that first customer is only using 20 lines out of a DS-3, that leaves 650 lines of capacity that you have fully paid for in the building."

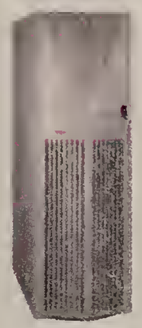
This year, WinStar expects to spend $600 million on capital expenditures. Of that, about $100 million is earmarked for the backbone, $150 million will be spent on switch build outs, $100 million will be used for hub sites, and the balance will go into connecting buildings and developing support infrastructure.

Asked if the incumbent local carriers are treating WinStar fairly, Rouhana says: "They don't make it easy, nor would you expect them to. After all, we're taking business from them. But the stories of the RBOCs and their ability to be incompetent leads you to wonder if that incompetence is strategic or endemic to their business."

— John Dix and Denise Pappalardo

You'll never guess what we were doing when we came up with the idea for our new server.

Actually, we were thinking of ways to help our clients reduce their total cost of operations. And it occurred to us that consolidating complicated IT environments would be a good place to start. Which, naturally, led to the development of the new Unisys Aquanta™ ES 5000 line of midrange servers based on the equally new Intel® Pentium® III Xeon™ processor. These robust servers help you handle workloads on multiple partitions, while maintaining single-image operations and management. And they improve availability by providing a fully recoverable environment for your applications, databases and transactions. For more points on our new servers, check out our Web site. Meanwhile, we'll be working on our, well, you know.
www.marketplace.unisys.com/ent/



Aquanta
ES 5000

UNISYS We eat, sleep and drink this stuff.

©1999 Unisys Corporation. Aquanta is a trademark of Unisys Corporation. Intel, Intel Inside and Pentium are registered trademarks and Pentium III Xeon is a trademark of Intel Corporation.

ALPHABETICAL COMPANY LISTING

1998 rank	Company	1998 rank	Company	1998 rank	Company	1998 rank	Company	1998 rank	Company
30	3Com	168	Centura Software	39	Frontier	27	NCR	70	Sequent Computer Systems
166	ACT Networks	51	Century Telephone Enterprises	176	FVC.com	153	NetManage	36	Silicon Graphics
62	Adaptec	127	Check Point Software	22	Gateway	189	Netopia	80	Skytel Communications
55	ADC Telecommunications	21	Cisco	110	General DataComm	64	Network Associates	103	Software AG
66	Adobe Systems	104	Citrix Systems	11	GTE	139	Network Computing Devices	16	Sprint (FON Group)
94	Adtran	154	Communications Systems	3	Hewlett-Packard	91	Network Equipment Technologies	56	Sprint (PCS Group)
31	Alltel	5	Compaq	60	Hughes Network Systems	187	Network Peripherals	196	Spyglass
40	America Online	45	CompuCom Systems	133	Hummingbird Communications	50	Newbridge Networks	123	Standard Microsystems
61	American Management Systems	32	Computer Associates	102	Hypercom	128	Nextlink	82	Sterling Commerce
58	American Power Conversion	131	Computer Network Technology	1	IBM	13	Nortel Networks	74	Sterling Software
14	Ameritech	26	Computer Sciences	97	ICG Communications	59	Novell	44	StorageTek
29	AMP	76	Comverse Technology	71	Informix	151	ODS Networks	20	Sun
69	Andrew	145	Concentric Network	147	Infoseek	197	ON Technology	68	Sybase
42	Anixter	178	Concord Communications	111	Inprise	160	Open Market	79	Symantec
149	Apex PC Solutions	177	Cylink	10	Intel	24	Oracle	63	Symbol Technologies
28	Apple	161	D-Link Systems	170	Interleaf	95	PairGain Technologies	192	Sync Research
173	Architel Systems	53	Data General	185	Interlink Computer Sciences	129	PC DOCS	195	Tangram Enterprise Solutions
191	Artisoft	126	Datapoint	75	Intermedia Communications	159	Peregrine Systems	114	Tekelec
172	Asante Technologies	144	Davox	182	Internet Security Systems	184	Performance Technologies	47	Tektronix
52	Ascend	19	Dell	157	Interphase	86	PictureTel	49	Tellabs
81	Aspect Telecommunications	198	Develcon Electronics	78	Intuit	33	Pitney Bowes	84	Telxon
2	AT&T	92	Dialogic	193	Isocor	65	Platinum Technology	116	The Santa Cruz Operation
118	Auspex Systems	112	Digi International	152	Larscom	140	Premisys Communications	141	Transaction Network Services
146	AVT	167	Digital Link	87	Level 3 Communications	137	Procom Technology	190	Unify
142	Axent Technologies	89	Digital Microwave	100	Level One Communications	130	Prodigy Communications	23	Unisys
150	Banyan	134	Documentum	7	Lucent	106	Progress Software	18	US WEST
73	Belden	83	Dynatech	165	Lycos	175	Proxim	171	Verilink
4	Bell Atlantic	122	E.spire Communications	6	MCI WorldCom	101	PSINet	179	Verity
12	BellSouth	115	Earthlink	77	McLeodUSA	35	Qualcomm	200	Vertel
72	BMC Software	155	Edify	38	MediaOne	46	Qwest	119	Visio
155	Boca Research	15	EDS	181	Memotec Communications	138	Rainbow Technologies	113	VTEL
107	Boole & Babbage	135	Eicon Technology	188	Microlog	158	RealNetworks	120	Wall Data
180	BroadBand Technologies	34	EMC	37	Micron Technology	121	Remedy	48	Wang Global
174	Broadvision	163	Emulex	17	Microsoft	43	SAP America	132	Whittaker
143	Brooktrout Technology	183	Equinox Systems	135	MindSpring Enterprises	9	SBC Communications	105	WinStar
54	Cabletron	93	Exabyte	67	Mitel	199	SBE	125	World Access
98	California Microwave	124	Excite	164	Mobius Management Systems	57	Scientific-Atlanta	96	Xircom
194	Castelle	169	Exodus	8	Motorola	25	Seagate Technology	88	Xylan
148	Centigram Communications	90	FileNet	99	MRV Communications	117	Security Dynamics	108	Yahoo
109	Centron DPL	85	FORE Systems	41	National Semiconductor	186	SEEQ Technology	162	Zoom Telephonics

Continued from page 53

On the network front, Compaq last year seemed to step back from earlier efforts to become a full-blown network player when it redeployed network products among various product groups.

Server adapters were shifted into Compaq's server group, and modems and workstation adapters went into the PC group. Compaq's hubs, switches and routers will remain in the Network and Access Communications Division.

For the time being, anyway, it is still safe to call Compaq something of a pure computer player. Who knows how corporate strategy will shift once the company brings in Pfeiffer's replacement.

Change, of course, begets more change. The industry blending that has happened so far will spur more mergers and acquisitions as competitors react. It is one thing, after all, for a billion-dollar company to compete with a like-size billion-dollar company. But when that competitor becomes a division of a $15 billion company, it is quite another.

Not everyone will make it. The packet feast won't be served up until the flotsam is skimmed off and discarded.▲

SUFFERING THE MOST

Largest decline in revenue 1997-1998

1998 rank	Company	% Δ 1997-1998
197	ON Technology	-52%
172	Asante Technologies	-39%
148	Centigram Communications	-28%
185	Interlink Computer Sciences	-28%
38	MediaOne	-25%
191	Artisoft	-25%
199	SBE	-24%
25	Seagate Technology	-24%
181	Memotec Communications	-23%
139	Network Computing Devices	-21%
123	Standard Microsystems	-21%
187	Network Peripherals	-20%
151	ODS Networks	-19%
170	Interleaf	-19%
188	Microlog	-17%

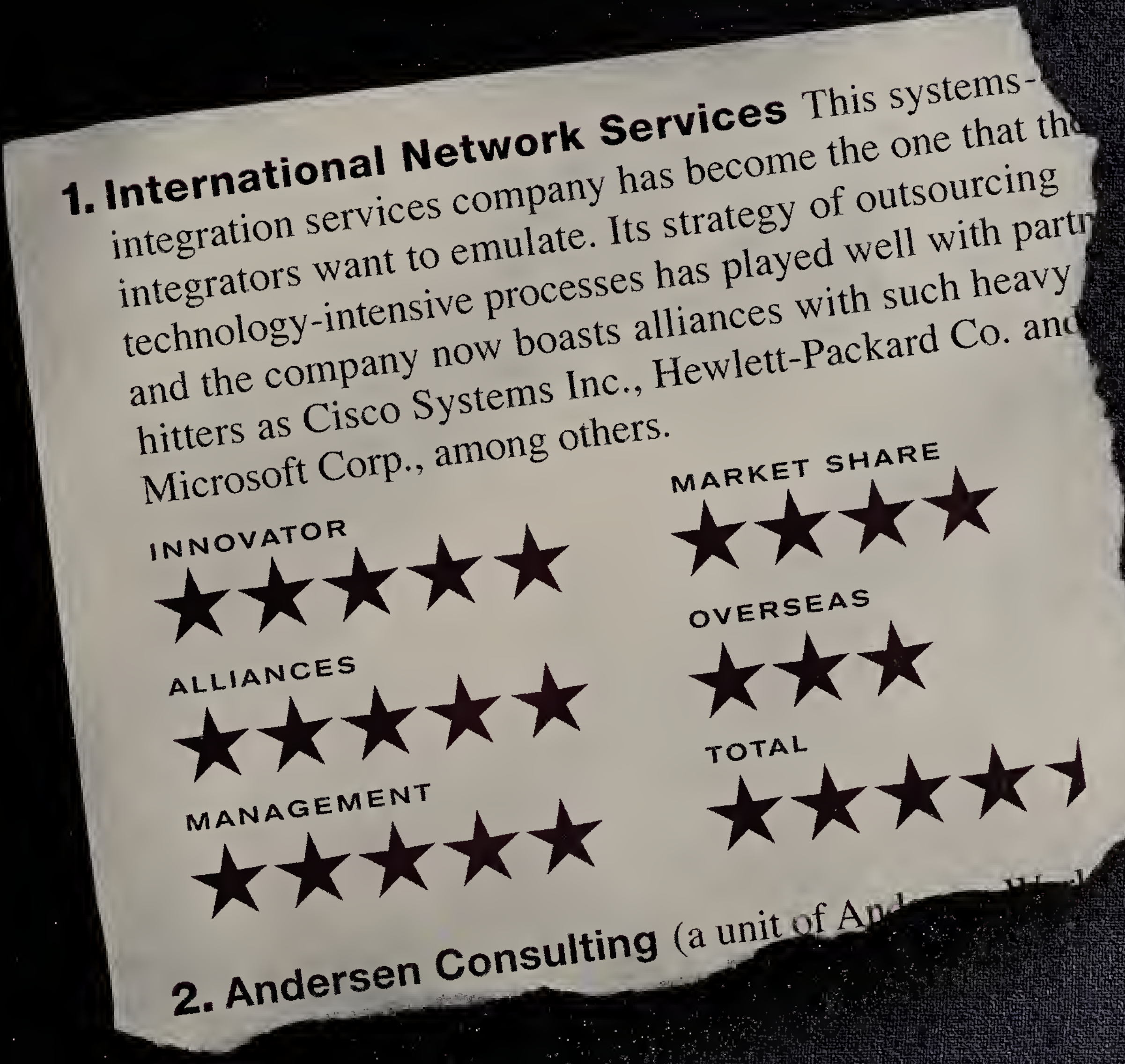
Largest decline in profits 1997-1998*

1998 rank	Company	% Δ 1997-1998
29	AMP	-100%
45	CompuCom Systems	-99%
113	VTEL	-94%
30	3Com	-94%
111	Inprise	-92%
143	Brooktrout Technology	-88%
199	SBE	-87%
138	Rainbow Technologies	-78%
135	Eicon Technology	-77%
142	Axent Technologies	-60%
173	Architel Systems	-45%
66	Adobe Systems	-44%
73	Belden	-43%
144	Davox	-43%
91	Network Equipment Technologies	-42%

* Based on calculable data. Some firms experienced far greater declines.

INS.

Now with more network stars than anyone.



1. International Network Services This systems-integration services company has become the one that th integrators want to emulate. Its strategy of outsourcing technology-intensive processes has played well with partn and the company now boasts alliances with such heavy hitters as Cisco Systems Inc., Hewlett-Packard Co. anc Microsoft Corp., among others.

INNOVATOR ★★★★★

MARKET SHARE ★★★★

ALLIANCES ★★★★★

OVERSEAS ★★★

MANAGEMENT ★★★★★

TOTAL ★★★★

2. Andersen Consulting (a unit of An

—Yankee Group/Upside Magazine, FEBRUARY 1999

It's official.

INS was just named the top high tech consulting firm, according to Yankee Group and Upside Magazine, who chose us over 140 other companies.

All of which confirms what network professionals have known for some time—that INS is the leading provider of network consulting and software solutions.

Our 1200 engineers and consultants have created many of today's most powerful and innovative networks. Each one accesses that experience through INS KnowledgeNet, our industry-leading database of over 10,000 networking solutions, and fully documents each project to make our clients as self-sufficient as possible.

That's why most of the Fortune 100 trust INS with their networks, and why 9 out of 10 clients come back to us with additional work.

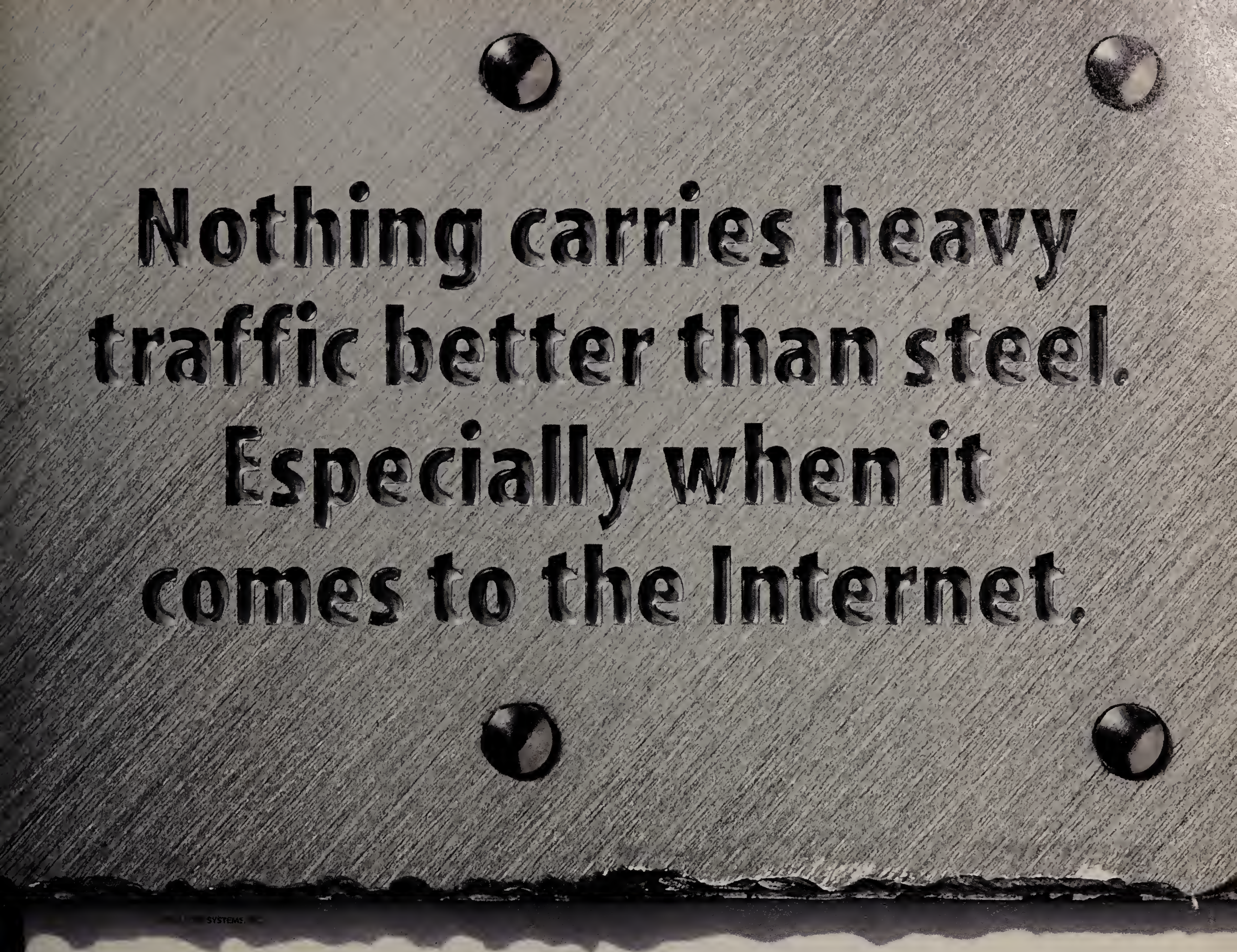
For more information on how our network stars can help you, please call 888-INS-8100. Or visit our website at www.ins.com.

I·N·S

The knowledge behind the network™

"The knowledge behind the network" is a servicemark of International Network Services. All other trademarks and registered trademarks are properties of their respective owners. ©1999 International Network Services All rights reserved

Free Product info enter NWInfoXpress #104 online @ **www.networkworld.com/infoxpress**


Nothing carries heavy traffic better than steel. Especially when it comes to the Internet.
SYSTEMS,

Internet traffic is doubling every 100 days. Corporate customers are demanding money-back guaranteed service levels. New applications are pushing the old Internet infrastructure beyond its limits.

The usual network solutions simply can't handle the load. But a network from FORE Systems can.

With optical multiplexing built-in, FORE's Internet core switches have bandwidth to burn.

And only FORE switches live up to even the most stringent service level guarantees. With link-failure recovery that's 200 times faster than other solutions. And prioritized rerouting for mission-critical connections.

All of which explains why the world's largest Internet Service Providers rely on Networks of Steel.™

After all, you can't build the new Internet on just anything.

FORE SYSTEMS

Networks of Steel.

www.fore.com *1.888.404.0444*

Free Product info enter NWInfoXpress #58 online @ **www.networkworld.com/infoxpress**

Rank			1998 revenue				1998 profit/loss				Mkt. cap.			Number of employees			Rev. per	R&D		
1998	1997	Company	$M	'97-'98 % △	'93-'98 CAGR	Int'l %	$M	'97-'98 % △	'93-'98 CAGR	% of rev.	$M 3/5/99	Stock symbol	Cash and invest $M	1998	'97-'98 % △	'93-'98 CAGR	employee 1998	% rev. 1997	% rev. 1998	Year Inc.
1	1	IBM	81,667	4%	5%		6,328.00	4%		8%	162,100	IBM	5,768	291,000	8%		$280,643	6%	6%	1911
2	2	AT&T	53,223	3%	4%	2%	6,398.00	45%	2%	12%	148,100	T	3,160	110,000	-14%		$483,845	2%		1885
3	3	Hewlett Packard	47,061	10%	18%	54%	2,945.00	-6%	20%	6%	68,726	HWP	4,067	124,600	2%	5%	$377,697	7%	7%	1939
4	4	Bell Atlantic	31,566	5%		1%	2,990.00	22%		9%	84,793	BEL	1,023	140,439	0%		$224,767			1984
5	9	Compaq	31,169	27%	29%	53%	(2,743.00)				56,631	CPQ	4,091	70,665	117%	28%	$441,081	3%	4%	1982
6		MCI WorldCom	30,416	15%	18%		1,070.00		9%	4%	152,300	WCOM								1983
7	6	Lucent	30,147	14%		26%	970.00	79%		3%	137,300	LU	685	140,000	8%		$215,336	11%	12%	1996
8	5	Motorola	29,398	-1%	12%		(962.00)				41,450	MOT	1,624	133,000	-11%	2%	$221,038	9%	10%	1928
9	8	SBC Communications	28,777	8%	7%		4,023.00	140%		14%	99,635	SBC		129,000	9%		$223,078			1983
10	7	Intel	26,273	5%	25%	55%	6,068.00	-13%	21%	23%	193,000	INTC	7,626	64,500	1%	17%	$407,333	9%	10%	1968
11	10	GTE	25,473	10%	5%	13%	2,172.00	-22%	17%	9%	60,561	GTE		117,500	3%	0%	$216,791	1%		1935
12	11	BellSouth	23,123	12%	8%		3,527.00	8%	32%	15%	89,232	BLS	3,003	88,450	9%	-1%	$261,425			1984
13	14	Nortel Networks	17,580	14%	17%	44%	(537.00)				37,362	NT		75,000	3%	4%	$234,400	14%	14%	1985
14	13	Ameritech	17,154	7%	8%		2,614.00	14%	12%	15%	67,022	AIT		70,500	-5%	1%	$243,319			1983
15	15	EDS	16,900	11%	15%	39%	743.40	2%	1%	4%	23,437	EDS	1,312	120,000	9%	11%	$140,833			1962
16	16	Sprint (FON Group)	16,016	8%	7%		1,535.30	12%	95%	10%	29,928	FON	433	60,000	19%	4%	$266,933			1899
17	18	Microsoft	14,484	28%	31%	22%	4,490.00	30%	36%	31%	388,600	MSFT	13,927	27,055	22%	13%	$535,354	17%	17%	1975
18	19	US WEST	12,378	8%	7%		1,508.00	-1%		12%	27,764	USW	49	64,000	35%	1%	$193,406			1984
19	22	Dell	12,327	59%	44%	31%	944.00	82%	16%	8%	106,600	DELL	1,844	16,000	55%	28%	$770,438	2%	2%	1984
20	21	Sun	9,791	14%	18%	48%	906.00	19%	42%	9%	39,995	SUNW	1,298	26,300	22%	15%	$372,281	10%	10%	1982
21	27	Cisco	8,458	32%	64%	41%	1,879.00	33%	61%	22%	155,100	CSCO	1,690	14,623	36%	52%	$578,404	11%	12%	1984
22	28	Gateway	7,468	19%	34%		349.40	218%	28%	5%	10,598	GTW		19,000	46%	26%	$393,047			1985
23	25	Unisys	7,208	9%	3%	57%	387.00		-7%	5%	7,949	UIS	604	33,200	2%	-3%	$217,108	5%	4%	1986
24	30	Oracle	7,144	26%	37%	50%	814.00	-1%	39%	11%	53,804	ORCL	1,919	37,000	26%	32%	$193,081	10%	10%	1977
25	20	Seagate Technology	6,819	-24%	18%		(530.00)				7,148	SEG	666	87,000	-22%	15%	$78,379	5%	9%	1979
26	31	Computer Sciences	6,601	18%	22%	33%	260.40	35%	27%	4%	10,779	CSC	275	45,000	7%	12%	$146,689			1959
27	26	NCR	6,505	-1%	-2%		122.00	1,643%		2%	4,199	NCR	514	33,100	-14%		$196,526	6%	5%	1884
28	24	Apple	5,941	-16%	-6%	45%	309.00		29%	5%	4,561	AAPL	2,300	9,663	-5%	-8%	$614,819	7%	5%	1977
29	29	AMP	5,482	-5%	8%		2.00	-100%	-64%		11,664	AMP	261	47,000	1%	9%	$116,638	10%	11%	1941
30	37	3Com	5,420	-3%	54%	45%	30.20	-94%	-5%	1%	8,969	COMS	1,100	12,920	-5%	46%	$419,505	9%	11%	1979
31	36	Alltel	5,200	16%	17%		580.30	21%	26%	11%	15,883	AT	55	21,504	4%	5%	$241,815			1983
32	34	Computer Associates	4,719	17%	21%	37%	1,190.00	23%	37%	25%	21,685	CA	310	11,400	16%	10%	$413,947	8%	8%	1974
33	33	Pitney Bowes	4,220	8%		14%	568.00	12%		13%	17,483	PBI	129	31,299	5%		$134,829	2%	2%	1920
34	38	EMC	3,974	35%	38%	38%	793.00	47%	44%	20%	52,380	EMC	1,530	9,400	49%	31%	$422,766	8%	8%	1979
35	43	Qualcomm	3,300	57%	81%		243.00	164%		7%	5,416	QCOM	249	11,000	55%	58%	$300,000	11%	11%	1985
36	35	Silicon Graphics	3,101	-15%	23%	48%	(459.60)				3,060	SGI	737	10,286	-6%	22%	$301,478	13%	15%	1982
37		Micron Technology	3,012	-14%	-4%		(233.70)				13,931	MU	649	11,400	-7%	18%	$264,202	6%	9%	1978
38	32	MediaOne	2,882	-25%		1%					34,821	UMG	415	16,000	23%		$180,125			1984
39	41	Frontier	2,800	17%	14%		175.80	453%	8%	6%	6,253	FRO	85	8,151	6%	6%	$343,516			1899
40	48	America Online	2,600	55%	130%		91.30		85%	4%	80,555	AOL	124	9,556	30%	105%	$272,080	5%	4%	1992
41	40	National Semiconductor	2,536	-6%	5%		(98.60)				1,764	NSM	573	12,000	-3%	-13%	$211,333	15%	19%	1959
42	39	Anixter	2,349	12%	6%	28%	65.60	45%		3%	521	AXE	21	6,000	7%	5%	$391,417			1957
43	52	SAP America	2,330	55%	72%						N/A	SAP		2,580	-2%	41%	$903,101			1972
44	42	StorageTek	2,258	5%	10%		198.20	-14%		9%	3,432	STK	232	8,500	2%	-3%	$265,671	10%	10%	1969
45	45	CompuCom Systems	2,250	15%	17%		0.40	-99%	-49%		194	CMPC	5							1987
46		Qwest	2,243	222%	101%		(844.00)				20,283	QWST	463	8,000	400%		$280,375			1988
47	46	Tektronix	2,100	8%	10%	48%	135.20	18%		6%	867	TEK	121	8,139	-3%	-4%	$258,017	10%	100%	1946
48	55	Wang Global	1,887	49%	9%		(281.60)				1,097	WANG	225	21,000	110%	25%	$89,857	0%	1%	1955
49	56	Tellabs	1,660	38%	39%		398.30	51%	66%	24%	15,892	TLAB	643	4,761	25%	15%	$348,666	13%	12%	1975
50	54	Newbridge Networks	1,621	18%	39%	49%	(18.00)				4,527	NN	499	6,336	2%		$255,840	11%	16%	1986
51	65	Century Telephone Enterprises	1,577	75%	29%		198.20	32%	23%	13%	5,919	CTL	6							1955
52	58	Ascend	1,479	27%	147%	29%	(19.65)				16,677	ASND	680	3,000	63%	103%	$493,000	13%	15%	1989
53	51	Data General	1,462	-5%	6%	38%	(152.40)				627	DGN	158	4,700	-8%	-6%	$311,064	7%	8%	1968
54	53	Cabletron	1,380	-2%	30%	33%	(127.10)				1,388	CS	324	6,887	4%	21%	$200,378	12%	13%	1983
55	59	ADC Telecommunications	1,380	19%	27%	20%	147.00	35%	36%	11%	5,354	ADCT	288	8,000	33%	27%	$172,500	11%	100%	1935
56		Sprint (PCS Group)	1,225				(2.40)				14,438	PCS	173	11,400			$107,491			1997
57	57	Scientific-Atlanta	1,181	1%	12%	32%	81.00	27%	32%	7%	2,185	SFA	271	6,203	13%	11%	$190,392	10%	9%	1951
58	66	American Power Conversion	1,126	29%	35%		147.60	21%	25%	13%	3,171	APCC	220					3%	3%	1981
59	61	Novell	1,084	8%	-1%	42%	102.00			9%	6,798	NOVL	1,007	4,510	-6%	1%	$240,355	28%	21%	1983
60	60	Hughes Network Systems	1,077	6%							4,975	GMH		3,000	-17%		$358,900			1971
61	67	American Management Systems	1,058	21%	24%	20%	51.80	67%	25%	5%	1,490	AMSY		8,144	8%	17%	$129,912			1979
62	62	Adaptec	1,007	8%	26%	30%	173.00	60%	29%	17%	2,263	ADPT	697	3,276	9%	20%	$307,387	14%	17%	1981
63	71	Symbol Technologies	978	26%	16%		93.00	32%	22%	10%	3,140	SBL	16					4%		1973
64	77	Network Associates	972	59%	46%						6,197	NETA		2,500	56%		$388,800	14%		1989
65	76	Platinum Technology	968	55%	38%		(2.50)				1,123	PLAT	267					30%	25%	1987
66	63	Adobe Systems	895	-2%	9%	49%	105.00	-44%	20%	12%	2,797	ADBE	273	2,600	-2%	1%	$344,154	19%	23%	1982
67	73	Mitel	886	27%	16%	55%	92.00	142%	98%	10%	817	MLT	152	6,400	57%	12%	$138,438	8%	10%	1973

Fiscal year ends	Web address	Chair	CEO	President	Products and services	Notes
12/31	ibm	Louis Gerstner	Louis Gerstner		Computer and network products and services	
12/31	att	C. Michael Armstrong	C. Michael Armstrong	John Zeglis	Long-distance services, network products and services	To merge with TCI in first-quarter 1999
10/31	hp	Lewis Platt	Lewis Platt	Lewis Platt	Measurement/computing/communications products	
12/31	bellatlantic	Ivan Seidenberg	Ivan Seidenberg	J. Cullen, L. Babbio	Wireless/directory/entertainment/information services	To merge with GTE in 1999
12/31	compaq	Benjamin Rosen			Servers, desktops, network products, home PCs, notebooks	FY98 loss includes charges from Digital acquisition
12/31	mciworldcom		Bernard Ebbers	Bernard Ebbers	Long-distance, cellular services and Internet access	'97 and '98 figures are pro forma
9/30	lucent	Richard McGinn	Richard McGinn		Network gear, telephone systems, microelectronics	To merge with Ascend Communications in June, 1999
12/31	mot	Gary Tooker	Christopher Galvin	Robert Growney	Wireless, semiconductors, cellular phones, two-way radio	
12/31	sbc	Edward Whitacre	Edward Whitacre	Edward Whitacre	Local, long-distance, cellular telephone services	To merge with Ameritech in mid-1999
12/31	intel	Andrew Grove	Craig Barrett	Craig Barrett	Semiconductors, PC, network products	To acquire Level One Communications in1999
12/31	gte	Charles Lee	Charles Lee	Kent Foster	Telecommunications	To merge with Bell Atlantic in 1999
12/31	bellsouth	Duane Ackerman	Duane Ackerman	Duane Ackerman	Local, wireless, video/information services	
12/31	nortel	Donald Schuenke	John Roth	David House	Telephone and data network gear	Formerly Northern Telecom. Acquired Bay Networks in June 1998
12/31	ameritech	Richard Notebaert	Richard Notebaert		Local, video, online services	To merge with SBC Communications in mid-1999
12/31	eds	Richard Brown	Richard Brown	Jeff Heller	Professional outsourcing and consulting services	
12/31	sprint	William Esrey	William Esrey	Ronald LeMay	Global voice, data, video services and related products	
6/30	microsoft	William Gates	William Gates	Steven Ballmer	Operating systems, applications	
12/31	uswest	Richard McCormick	Solomon Trujllo	Solomon Trujllo	Telecommunications	Formerly US WEST Communications
1/31	dell	Michael Dell	Michael Dell		PCs and peripherals	
6/30	sun	Scott McNealy	Scott McNealy	Scott McNealy	Enterprise network computing hardware, software, services	
7/31	cisco		John Chambers	John Chambers	Routers, LAN/WAN/ATM switches, net management software	
12/31	gateway	Theodore Waitt	Theodore Waitt	Jeffrey Weitzen	PCs, servers, workstations, PC-related products	
12/31	unisys	Lawrence Weinbach	Lawrence Weinbach	Lawrence Weinbach	Computers, information services, systems integration	
5/31	oracle	Lawrence Ellison	Lawrence Ellison	Raymond Lane	Database software, information management services	
6/30	seagate	Gary Filler	Steve Luczo	Steve Luczo	Disk/tape drives, storage systems	
3/31	csc	Van Honeycutt	Van Honeycutt	Van Honeycutt	Management consulting, systems integration, outsourcing	
12/31	ncr	Lars Nyberg	Lars Nyberg		Data warehousing, communications	
9/30	apple		Steve Jobs		Personal systems, software, servers, communications	
12/31	amp	Robert Ripp	Robert Ripp	William Hudson	Cabling, LAN interconnect systems, fiber-optic connectors	To merge with Tyco International in March 1999
5/31	3com	Eric Benhamou	Eric Benhamou	Bruce Claflin	Data network equipment, internetworking/remote access	
12/31	alltel	Joe Ford	Joe Ford	Scott Ford	Wireline, wireless and information services	
3/31	cai	Charles Wang	Charles Wang	Sanjay Kumar	Mainframe/client/server software, database, applications	
12/31	pitneybowes	Michael Critelli	Michael Critelli	Marc Breslawsky	Mail and messaging management	
12/31	emc	Richard Egan	Michael Ruettgers	Michael Ruettgers	Storage systems, data migration, backup facilities	
9/27	qualcomm	Irwin Jacobs	Irwin Jacobs	Richard Sulpizio	Digital wireless communications	
6/30	sgi	Richard Belluzzo	Richard Belluzzo		Unix and NT workstations, servers, supercomputers	
8/31	micron	Steven Appleton	Steven Appleton	Steven Appleton	DRAMS, SRAMS, Flash, PCs	
12/31	mediaonegroup	Charles Lillis	Charles Lillis		Broadband/telecom services	Formerly US WEST MediaOne
12/31	frontiercorp		Joseph Clayton	Joseph Clayton	Data, Internet, local/long-distance, cellular services	
6/30	aol	Stephen Case	Stephen Case	Robert Pittman	Internet access	
5/31	national	Brian Halla	Brian Halla	Brian Halla	Analog/digital chips, video technology, data compression	
12/31	anixter		Robert Grubbs	Robert Grubbs	Cabling/network systems for data/voice/video applications	
12/31	sap	H.C. Hasso Plattner	Kevin McKay	Jeremy Coote	Business application software	Subsidiary, SAP AG (Germany)
12/31	storagetek	David Weiss	David Weiss	David Weiss	Tape/disk software, routers	
12/31	compucom	Charles Root	Ed Anderson	Ed Anderson	Network/PC integration, management, support, procurement	
12/31	qwest	Philip Anschutz	Joseph Nacchio	Joseph Nacchio	Telephone communications	Acquired LCI International in June 1988
5/29	tek	Jerome Meyer	Jerome Meyer	Jerome Meyer	Measurement, color printing, imaging, video, networking	
6/30	wang	Joseph Tucci	Joseph Tucci	J.J.J. van Vuuren	Networked technology services and solutions	Formerly Wang Laboratories
12/31	tellabs	Michael Birck	Michael Birck	Michael Birck	Cross connects, network access systems	
4/30	newbridge	Terence Matthews	Terence Matthews	Alan Lutz	WAN, ATM, switched routing, frame relay, multiplexers	Canadian company. Figures in Canadian currency.
12/31	centurytel	Clarke Williams	Glen Post	Glen Post	Local, wireless, long-distance and Internet access	
12/31	ascend	Mory Ejabat	Mory Ejabat	Mory Ejabat	Enterprise and carrier network gear	To merge with Lucent Technologies in June, 1999
9/30	dg	Frederick Adler	Ronald Skates	Ronald Skates	Servers, storage systems and related software/services	
2/28	cabletron	Craig Benson	Craig Benson	Craig Benson	Ethernet, token ring, FDDI, ATM/remote access	
10/31	adc	William Cadogan	William Cadogan	William Cadogan	Transmission, broadband, net integration	
12/31	sprint	William Esrey	William Esrey	Andrew Sukawaty	Wireless telephony products and services	
6/30	sciatl	James Napier	James McDonald	James McDonald	Broadband telecom, satellite-based video/voice/data networks	
12/31	apcc	Rodger Dowdell	Rodger Dowdell	Rodger Dowdell	Uninterruptible power supplies, power protection/conditioning	
10/31	novell	Eric Schmidt	Eric Schmidt	Eric Schmidt	Network operating systems, applications, distributed services	
12/31	hns	Jack Shaw	Jack Shaw	Pradman Kaul	Network operating systems	Unit of General Motors Corp. Shows GM's market cap.
12/31	amsinc	Paul Brands	Paul Brands		Business and IT consulting	
3/31	adaptec	Larry Boucher	Larry Boucher	Bob Stephens	Interface cards, ATM networking, recordable CD, RAID	
12/31	symbol	Jerome Swartz	Jerome Swartz	Tomo Razmilovic	Wireless LAN products, handheld computers, bar-code scanning	
12/31	nai	William Larson	William Larson	William Larson	Antivirus, fault and performance mgmt., helpdesk software	
12/31	platinum		Andrew Filipowski	Andrew Filipowski	Application development, data warehousing, DBMS	
11/30	adobe	C. Geschke, J. Warnock	John Warnock	Charles Geschke	Graphics/layout, multimedia, Internet publishing	
3/26	mitel	Henry Simon	Kirk Mandy	Kirk Mandy	Voice systems, computer telephony integration	Canadian company

Rank			1998 revenue				1998 profit/loss				Mkt. cap.			Number of employees			Rev. per	R&D		
1998	1997	Company	$M	'97-'98 %△	'93-'98 CAGR	Int'l %	$M	'97-'98 %△	'93-'98 CAGR	% of rev.	$M 3/5/99	Stock symbol	Cash and invest $M	1998	'97-'98 %△	'93-'98 CAGR	employee 1998	% rev. 1997	% rev. 1998	Year Inc.
68	64	Sybase	867	-4%	15%		(93.00)				587	SYBS	249	4,700	-10%	13%	$184,468	15%	17%	1984
69	68	Andrew	853	-2%	17%	25%	103.80	18%	29%	12%	1,212	ANDW	78	4,221	0%	6%	$202,085	5%	3%	1937
70	70	Sequent Computer	784	-6%	17%		(52.50)				457	SQNT	193	2,700	-4%	10%	$290,444	8%	10%	1983
71	75	Informix	735	11%	16%		57.70		1%	8%	1,572	IFMX	221	3,950	10%		$186,076	21%	20%	1980
72	80	BMC Software	730	30%	214%	35%	165.00	1%	20%	23%	8,370	BMCS	128	3,400	83%	36%	$214,706	14%	13%	1980
73	72	Belden	724	-3%	14%		34.50	-43%	1%	5%	432	BWC	3							1902
74	84	Sterling Software	720	26%	12%	39%	76.04			11%	2,025	SSW	397	3,500	13%	5%	$205,698	5%	5%	1981
75	104	Intermedia Communications	713	188%	145%		(487.00)				1,014	ICIX	388	3,931	93%	132%	$181,379			1986
76	96	Comverse Technology	695	42%	36%	65%	111.50	223%	41%	16%	3,266	CMVT	620	3,200	13%		$217,188	20%	19%	1984
77		McLeodUSA	604	125%	232%		(124.90)				2,546	MCLD	383	5,262	6%	146%	$114,804			1993
78	78	Intuit	593	-1%	37%	12%	(12.20)				5,299	INTU	226	2,860	-5%	37%	$207,343	16%	18%	1983
79	85	Symantec	578	22%	23%	32%	85.00	227%		15%	974	SYMC	196	2,300	15%	18%	$251,304	19%	16%	1982
80	88	Skytel Communications	518	27%	32%		80.60		37%	16%	1,064	SKYT	355	2,700	23%	32%	$191,852			1987
81	90	Aspect Telecommunications	512	31%	37%		32.50	-7%	23%	6%	390	ASPT	65					12%	13%	1985
82		Sterling Commerce	490	40%	33%	21%	(61.20)				2,736	SE	28	2,300	35%		$213,043	7%	6%	1974
83	91	Dynatech	473	31%	0%		41.80	40%	21%	9%	848	DYNA	314	2,249	2%	-7%	$210,316	12%	12%	1985
84	87	Telxon	466		14%	12%	15.20			3%	97	TLXNE		1,550	-3%		$300,645	9%	8%	1969
85	89	FORE Systems	458	16%	142%	31%	35.20	-15%	159%	8%	1,578	FORE	59	1,592	17%	61%	$287,688	14%	15%	1990
86	86	PictureTel	406	-13%	17%		(55.70)				315	PCTL	40					17%	15%	1984
87		Level 3 Communications	392	18%	8%		*730	194%	32%		17,621	LVLT	71	2,200	29%		$178,182			1985
88	106	Xylan	348	65%		50%	39.40	63%		11%	1,530	XYLN	162	1,044	45%		$332,950	12%	12%	1993
89	118	Digital Microwave	310	47%	24%	22%	19.90	44%		6%	510	DMIC	40	1,147	38%	20%	$270,270	6%	6%	1984
90	103	FileNet	310	24%	18%		1.00				264	FILE	71					16%	16%	1982
91	95	Network Equipment	309	-5%	7%	37%	14.00	-42%		5%	180	NWK	51	1,408	3%	5%	$219,460	13%	4%	1987
92	101	Dialogic	294	12%	25%		36.60	66%	25%	12%	562	DLGC	234	1,200	20%	26%	$244,583	20%	22%	1983
93	94	Exabyte	287	-15%	32%		(2.80)				109	EXBT	106	1,284	-11%	4%	$223,520	12%	10%	1985
94	100	Adtran	287	8%	-2%		40.30	1%	25%	14%	761	ADTN	470					11%	13%	1986
95	98	PairGain Technologies	283	0%	51%	20%	39.60	-18%	39%	14%	611	PAIR	27	692	8%	41%	$409,104	11%	13%	1988
96	116	Xircom	276	49%	27%		18.30		14%	7%	894	XIRC	21	1,000	25%	39%	$276,000	7%	6%	1988
97	99	ICG Communications	276	1%	36%		(299.30)				863	ICGX	82	3,251	47%	50%	$84,866			1986
98	102	California Microwave	269	6%	-3%	33%	(8.00)				140	CMIC	485	1,528	8%	2%	$176,047	7%	7%	1968
99	120	MRV Communications	264	60%	107%		(20.00)				178	MRVC	98					8%	10%	1988
100		Level One Communications	263	68%	59%	22%	22.90	19%	44%	9%	1,644	LEVL	60	821	57%	43%	$320,341	19%	21%	1985
101	131	PSINet	260	113%	97%		(212.90)				1,923	PSIX	185							1989
102		Hypercom	257	31%	35%	57%	21.30	14%	19%	8%	336	HYC	313	1,100	100%	41%	$233,818	7%	9%	1978
103	117	Software AG	249	38%	12%		27.70	313%	34%	11%	352	AGS	114	1,000	5%		$249,000	1%	2%	1981
104	130	Citrix Systems	249	100%	117%	31%	36.30	-11%		15%	3,414	CTXS	93	621	106%	61%	$400,322	6%	10%	1989
105	145	WinStar	244	243%	85%		(444.70)				1,566	WCII	482							1990
106	115	Progress Software	240	28%	16%	57%	23.00		12%	10%	522	PRGS	4	1,200	9%	7%	$200,000	14%	13%	1981
107	111	Boole & Babbage	218	11%	12%	58%	36.70	172%	81%	17%	715	BOOL	84	930	7%	7%	$234,409	13%	13%	1967
108	154	Yahoo	203	189%			49.90			25%	31,731	YHOO	10	803	173%		$253,051	17%	11%	1995
109	105	Centron DPL	195	-8%	14%	28%					1,730	GMT	30	247	-26%	14%	$789,474			1984
110	107	General DataComm	194	-7%	-2%		(33.00)				56	GDC	32	1,572	-13%	-3%	$123,410	25%	23%	1969
111	122	Inprise	189	25%	-16%	49%	8.35	-92%		4%	235	INPR	51	950	19%	-5%	$199,065	36%	25%	1983
112	119	Digi International	183	10%	14%		(22.60)				116	DGII	158	703	46%	16%	$260,171	11%	9%	1985
113	114	VTEL	180	-6%	42%	9%	3.00	-94%		2%	50	VTEL	51	740	1%	23%	$243,243	13%	11%	1986
114	129	Tekelec	177	41%	30%		39.20	35%		22%	677	TKLC	109					17%	15%	1979
115		Earthlink	176	122%			(17.00)				1,873	ELNK	137							1994
116	112	The Santa Cruz Operation	172	-11%	-1%		(14.70)				178	SCOC	370	1,136	5%	-1%	$151,408	24%	24%	1979
117	126	Security Dynamics	171	21%	59%	26%	29.00	71%	71%	17%	703	SDTI	56	765	53%	50%	$223,529	19%	22%	1984
118	109	Auspex Systems	169	-16%	18%	34%	(17.30)				235	ASPX	62	612	2%	15%	$275,980	12%	20%	1987
119		Visio	166	64%	88%	41%	28.10	105%		17%	919	VSIO	55	555	56%		$299,099	16%	16%	1990
120	125	Wall Data	160	13%	20%		7.00	218%	-6%	4%	140	WALL	12	813	3%	16%	$196,556	14%		1982
121	128	Remedy	157	22%	81%		19.00	-30%	62%	12%	546	RMDY	83					16%	21%	1990
122	164	E.spire Communications	157	166%			(163.00)				386	ESPI	63	1,230	53%		$127,642			1993
123	92	Standard Microsystems	156	-21%	-9%	71%	(18.90)				130	SMSC	12	481	-39%		$323,701	6%	9%	1971
124	174	Excite	154	185%			(36.90)				5,935	XCIT	12	711	64%		$216,596	31%	19%	1994
125		World Access	152	213%			(114.60)				182	WAXS	138							1983
126	124	Datapoint	151	6%	-6%	97%	(0.67)				18	DPT	100	652	2%		$231,595	1%	2%	1968
127	143	Check Point Software	142	71%		50%	69.90	75%		49%	1,426	CHKP	12	450	50%		$315,333	7%	7%	1993
128		Nextlink	140	143%			(337.00)				16,000	NXLK	1,500	2,299	73%		$60,896		73%	1994
129	169	PC DOCS	136	42%	42%	26%	(79.40)				120	DOCS		886			$153,950	13%	15%	1986
130		Prodigy Communications	136	1%			(65.10)				2,541	PRGY		313	3%		$434,824	13%	9%	1984
131	138	Computer Network Technology	133	36%	19%	30%	4.70		-1%	4%	241	CMNT		600	-5%	13%	$292,222	18%	15%	1983
132		Whittaker	132	46%	3%	23%	48.50	-7%	46%	37%	223	WKR		450	-10%		$185,714	1%	1%	1942
133	137	Hummingbird Communications	130	10%	56%	42%	27.00	84%	38%	21%	265	HUMC		700	84%	88%	$196,508	13%	12%	1984
134	148	Documentum	124	63%	128%		12.90	-77%		10%	379	DCTM		630	75%		$218,182	14%	15%	1990

Fiscal year ends	Web address	Chair	CEO	President	Products and services	Notes
12/31	sybase	John Chen	John Chen	John Chen	Databases, middleware, e-commerce, data warehousing	
9/30	andrew	Floyd English	Floyd English	Floyd English	Coaxial cable/connectors/access, microwave, wireless	
12/31	sequent	Casey Powell	Casey Powell	John McAdam	Symmetric multiprocessing, decision support	
12/31	informix	Robert Finocchio	Robert Finocchio	Robert Finocchio	Database management systems, tools, connectivity	Purchased Red Brick Systems in December 1998
3/31	bmc	Max Watson	Max Watson	Max Watson	Enterprise management software	To merge with Boole & Babbage in second quarter 1999
12/31	belden	C. Baker Cunningham	C. Baker Cunningham	C. Baker Cunningham	Copper/fiber optic network cables	
9/30	sterling	Sam Wyly	Sterling Williams	Sterling Williams	Applications/systems mgmt., federal systems software	
12/31	intermedia	David Ruberg	David Ruberg	David Ruberg	Voice data, business Internet connectivity, Web hosting	
1/31	comverse	Kobi Alexander	Kobi Alexander	Kobi Alexander	High-performance systems, voice messaging, multimedia	FY98 figures based on a 13-month period due to fiscal change
12/31	mcleodusa	Clark McLeod	Clark McLeod	Stephen Gray	Integrated telecommunications services	
7/31	intuit	William Campbell	William Harris	William Harris	Finance/tax preparation software	
3/31	symantec	Carl Carman	Gordon Eubanks	Gordon Eubanks	Remote computing, enterprise development, security	
12/31	skytel	John Palmer	John Stupka	John Stupka	International wireless messaging, paging	Formerly Mobile Telecommunications
12/31	aspect	Jim Carreker	Jim Carreker	Jim Carreker	Automatic call distributors, interactive response	
9/30	sterlingcommerce	Sterling Williams	Warner Blow	Warner Blow	E-commerce software developer	
3/31	dynatech	John Reno	John Reno	John Reno	LAN/WAN access, matrix switches, packet switches	Market cap reflects capitalization as of May 1998
3/31	telxon	Raj Reddy	Frank Brick	Frank Brick	Wireless mobile computers and networks	
3/31	fore	Eric Cooper	Thomas Gill	Thomas Gill	ATM/LAN switches, multiplexers, net management software	
12/31	picturetel	Bruce Bond	Bruce Bond	Bruce Bond	Videoconferencing/teleconferencing equipment	
12/31	level3	Walter Scott	James Crowe	James Crowe	IP services	*FY97 and FY98 net profits include one-time gains
12/31	xylan	Steve Kim	Steve Kim	Steve Kim	Network management	To be acquired by Alcatel SA in April 1999
3/31	dmcwave	Charles Kissner	Charles Kissner	Sam Smookler	Digital microwave radios	
12/31	filenet	Ted Smith	Lee Roberts	Lee Roberts	Workflow, document imaging, document management	
3/31	net	Hans Wolf	Joseph Francesconi	Joseph Francesconi	Multiservice backbone networks and associated services	
12/31	dialogic	Nick Zwick	Howard Bubb	Howard Bubb	Computer telephony components, voice processing	
12/31	exabyte	William Marriner	William Marriner	William Marriner	Tape drives and intelligent, fully automated libraries	
12/31	adtran	Mark Smith	Mark Smith	Howard Thrailkill	Digital telecommunications equipment	
12/31	pairgain	Charles Strauch	Michael Pascoe	Michael Pascoe	High-speed digital communications systems	
9/30	xircom	Dirk Gates	Dirk Gates	Dirk Gates	PC cards and integrated PC cards for mobile computers	
12/31	icgcomm	William Laggett	J. Shelby Bryan	J. Shelby Bryan	Competitive local exchange carrier	
6/30	calmike	Frederick Lawrence	Frederick Lawrence	Frederick Lawrence	Satellite earth stations/microwave radios	
12/31	mrv	Shlomo Margalit	Noam Lotan	Noam Lotan	Networking, network access and fiber-optic transmission	Acquired Xyplex in February 1998
12/31	level1	Robert Pepper	Robert Pepper	Robert Pepper	Silicon connectivity solutions	To be acquired by Intel in second quarter 1999
12/31	psi	William Schrader	William Schrader	William Schrader	Dial-up for LAN remote access, Web hosting/security/intranet	In 1998 purchased 17 companies for approxmately $260 million
6/30	hypercom	George Wallner	Al Irato	Al Irato	WAN access gateway, switches and routers	
12/31	sagafyi		Daniel Gillis	Daniel Gillis	Enterprise systems software and middleware	
12/31	citrix	Ed Iacobucci	Mark Templeton	Mark Templeton	Server-based computing software	
12/31	winstar	William Rouhana	William Rouhana	Nathan Kantor	Local/long-distance telephony, Internet access, wireless	
11/30	progress		Joseph Alsop	Joseph Alsop	Application development tools and DBMS	
9/30	boole	Franklin Johnson	Paul Newton	Paul Newton	Enterprise availability management	To merge with BMC Software second quarter FY99
12/31	yahoo	Tim Koogle	Tim Koogle	Jeff Mallett	Internet media company	
12/31	centrondpl		Rick Soskin	Rick Soskin	Network design and management, routers, hubs, switches	GATX subsidiary (shows GATX's market cap)
9/30	gdc	Charles Johnson	Charles Johnson	Ross Belson	ATM switches, network access, transmission products	
12/31	inprise	Delbert Yocam	Delbert Yocam	Delbert Yocam	Application servers, training, consulting, development tools	Formerly Borland International
9/30	dgii	John Schinas	Jerry Dusa	Jerry Dusa	Data communications hardware	
7/31	vtel	Dick Moeller	Jerry Benson	Jerry Benson	Interactive multimedia videoconferencing systems	
12/31	tekelec	Jean-Claude Asscher	Michael Margolis	Michael Margolis	Advanced diagnostic and testing equipment, net switches	
12/31	earthlink	Sky Dayton	Garry Betty	Garry Betty	Dial-up and dedicated Internet services, Web site hosting	
9/30	sco	Alok Mohan	Doug Michels	Doug Michels	Unix system software, client/server integration software	
12/31	securitydynamics	Charles Stuckey	Charles Stuckey	Arthur Coviello	Enterprisewide network security products	
6/30	auspex		Bruce Moore	Bruce Moore	File servers, software	
9/30	visio		Jeremy Jaech	Jeremy Jaech	Drawing software	
12/31	walldata	Robert Frankenberg	John Wall	John Wall	Information access and data management software	FY98 data is four quarters ending 4/98, 7/98, 10/98 and 1/99
12/31	remedy	Larry Garlick	Larry Garlick	Larry Garlick	Help-desk software	
12/31	espire.net	Anthony Pompliano	Anthony Pompliano		Local/long-distance voice, ATM/frame relay and Internet	Formerly American Communications Services, Inc (ACSI)
2/28	smsc	Paul Richman	Paul Richman	Arthur Sidorsky	PC LAN systems, semiconductors, VLSI	
12/31	excite		George Bell	John Polumbo	Web search and retrieval services	
12/31	worldaccess	Steven Odom	John Phillips	John Phillips	Wireline/wireless switching, transmission/access products	Acquired Telco Systems in November 1998
7/31	datapoint	Asher Edelman	Asher Edelman	Blake Thomas	Computer systems, network integration software	
12/31	checkpoint	Gil Shwed	Gil Shwed	Deborah Triant-Rieman	Enterprise security and bandwidth management software	
12/31	nextlink	Steven Hooper	Steven Hooper	George Transue	CLEC, wireless, long-distance and Internet services	Shows market cap on April 14, 1999
6/30	pcdocs	Rubin Osten	Rubin Osten	Rubin Osten	Enterprise document/information management	Canadian company. Figures in Canadian currency
12/31	prodigy	Samer Salameh	Samer Salameh	David Trachtenberg	Internet services	
12/31	cnt	John Rollwagen	Thomas Hudson	Thomas Hudson	Storage area networking, channel networking	
10/31	whittaker	J.F. Alibrandi	J.F. Alibrandi	J.F. Alibrandi	Network products	
9/30	hummingbird	Fred Sorkin	Fred Sorkin	Fred Sorkin	Enterprise/network solutions, business intelligence software	
12/31	documentum	Robert Adams	Jeffrey Miller	Jeffrey Miller	Enterprise document management software and consulting	

Rank			1998 revenue				1998 profit/loss				Mkt. cap.			Number of employees			Rev. per employee 1998	R&D		
1998	1997	Company	$M	'97-'98 %△	'93-'98 CAGR	Int'l %	$M	'97-'98 %△	'93-'98 CAGR	% of rev.	$M 3/5/99	Stock symbol	Cash and invest $M	1998	'97-'98 %△	'93-'98 CAGR		% rev. 1997	% rev. 1998	Year Inc.
135	134	Eicon Technology	120	8%			6.59	77%		5%	N/A	EIC		550	100%		$218,182		12%	1984
136	172	MindSpring Enterprises	115	117%			10.50			9%	2,528	MSPG	168	977	33%		$117,707			1994
137	135	Procom Technology	112	3%	22%		6.50	-19%	61%	6%	67	PRCM	23	350	42%		$319,714	4%	4%	1987
138		Rainbow Technologies	109	15%	20%		2.50	-78%	-18%	2%	188	RNBO						9%		1984
139	127	Network Computing Devices	106	-21%	-6%		(9.10)				86	NCDI						11%		1988
140		Premisys Communications	102	31%	96%	5%	13.72	26%		13%	190	PRMS	107	352	28%	64%	$290,619	13%	16%	1991
141	161	Transaction Network Services	102	62%	55%	3%	7.00		31%	7%	245	TNSI	15	194	55%		$525,773	5%	5%	1990
142	152	Axent Technologies	101	44%		27%	7.68	-60%		8%	900	AXNT	112	510	29%		$198,039	19%	18%	1994
143	150	Brooktrout Technology	101	40%	41%		0.30	-88%	-33%		138	BRKT	12	450	73%	54%	$224,444	19%		1984
144	146	Davox	89	6%	21%		8.50	-43%	86%	10%	122	DAVX	60					12%	13%	1981
145	178	Concentric Network	83	82%			(94.10)				886	CNCX	151	550	42%		$150,545	11%	9%	1991
146	166	AVT	81	40%	31%	20%	11.60	49%	36%	14%	1,430	AVTC	39	320	12%		$253,438			1982
147	185	Infoseek	81	134%		2%	(109.70)				4,251	SEEK	94	700	278%		$115,571	21%	15%	1993
148	136	Centigram Communications	78	-28%	5%	46%	(12.00)				72	CGRM	57	325	-22%		$240,000	19%	23%	1980
149		Apex PC Solutions	76	37%			15.70	52%		21%	279	APEX	52	70	-3%		$1,085,714	4%	4%	1993
150	149	Banyan	75	1%	-10%		1.10		-39%	1%	184	BNYN		410		-10%	$182,927	22%	15%	1983
151	139	ODS Networks	75	-19%	6%		(25.80)				69	ODSI	22					12%	16%	1983
152	147	Larscom	73	-4%	13%	3%	(7.10)				37	LARS	24	233	-10%		$312,017	13%	16%	1970
153	162	NetManage	72	17%	20%		(9.97)				186	NETM	43	450	2%	34%	$159,333	34%	26%	1990
154		Communications Systems	71	-6%	8%		7.90	-28%	3%	11%	90	CSII								1970
155	168	Edify	71	24%	78%		(6.70)				105	EDFY	35	440	26%	47%	$161,136	18%	17%	1990
156	151	Boca Research	70	0%	1%		(14.60)				33	BOCI	7	260	8%	0%	$269,231	4%	4%	1985
157	157	Interphase	69	4%	13%	22%	2.70			4%	42	INPH	8	275	24%	3%	$250,182	20%		1974
158	188	RealNetworks	65	97%			(16.00)				2,678	RNWK	90	434	33%		$149,770	61%	49%	1994
159	183	Peregrine Systems	62	77%	37%	35%	(25.60)				1,183	PRGN	22	350	94%		$177,143	17%	13%	1980
160	163	Open Market	62	2%			(34.90)				416	OMKT	36	400	-20%		$155,000	44%	37%	1994
161	176	D-Link Systems	62	24%	22%						N/A	N/A		128	21%	39%	$484,375	100%	10%	1986
162	160	Zoom Telephonics	61	-4%	2%		(2.20)				31	ZOOM	19					6%	7%	1977
163	159	Emulex	60	-8%	-11%	35%	(10.80)				216	EMLX	2	160	-52%	-21%	$371,875	15%	19%	1979
164		Mobius Management Systems	57	37%	34%		4.60	92%	73%	8%	256	MOBI	42	335	19%		$168,657	14%	14%	1981
165		Lycos	56	155%			(97.00)				3,639	LCOS	154	456	233%		$122,807	18%	16%	1995
166	177	ACT Networks	55	12%	19%	64%	(19.40)				124	ANET	47	242	-9%		$227,273	17%	30%	1987
167	156	Digital Link	55	-17%	55%		(6.50)				57	DLNK	16					17%	24%	1985
168	165	Centura Software	54	-8%	2%	56%	2.10			4%	35	CNTR		220	22%	-8%	$243,182			1994
169		Exodus	53	325%			(68.50)	157%			2,880	EXDS	156	472			$112,288	17%	19%	1984
170	158	Interleaf	53	-19%	-15%	31%	2.40		-24%	5%	26	LEAF	21	310	-9%	-19%	$169,677	23%	17%	1981
171	167	Verilink	51	-11%	-5%		(1.00)				47	VRLK	42	250	14%	14%	$204,000	16%	24%	1982
172	142	Asante Technologies	51	-39%		22%	(14.00)				9	ASNT		130	-32%	-6%	$392,308	8%	13%	1988
173		Architel Systems	51	55%	13%		2.30	-45%		5%	252	ASYCF						21%		1984
174	194	Broadvision	50	86%		45%	(4.00)				1,219	BVSN	11	235	33%		$213,191	26%	18%	1993
175	179	Proxim	50	16%	44%		4.70	46,000%		9%	285	PROX	67					20%	15%	1984
176	196	FVC.com	44	136%			1.10			2%	192	FVCX	27	140	106%		$317,143	29%	21%	1998
177	144	Cylink	43	-10%			5.20			12%	127	CYLK	47					26%	37%	1984
178		Concord Communications	40	102%	62%	17%	9.10	6,847%		23%	795	CCRD	11	173	56%		$228,324	23%	18%	1980
179		Verity	39	-9%	21%	6%	(16.50)				448	VRTY	6	250	-20%		$156,000	33%	40%	1988
180		BroadBand Technologies	39	160%	15%		(2.80)				25	BBTK	94					187%	49%	1988
181	182	Memotec Communications	38	-23%			(2.40)				N/A	N/A		180	-11%		$210,556	13%	16%	1994
182		Internet Security Systems	36	167%			(4.00)				1,110	ISSX	53	350	148%		$102,857	22%	25%	1994
183	193	Equinox Systems	31	12%	11%	18%	4.60	15%	24%	15%	57	EQNX	19	100	5%	4%	$313,000	11%	10%	1983
184		Performance Technologies	30	0%	23%		5.80	14%	37%	19%	82	PTIX						12%	14%	1981
185	198	Interlink Computer Sciences	29	-28%	7%		(7.40)				30	INLK	18	165	-14%	11%	$175,758	200%	38%	1985
186	190	SEEQ Technology	28	-11%	-3%	28%	(5.50)				81	SEEQ	10	75	7%		$374,667	11%	16%	1981
187	184	Network Peripherals	28	-20%	21%		(7.90)				82	NPIX	23	130	-14%	20%	$215,385	29%	39%	1989
188	189	Microlog	27	-17%	5%		(8.40)				5	MLOG						11%		1969
189	173	Netopia	25	25%		32%	(0.69)				72	NTPA	42	188	7%		$132,979	35%	28%	1986
190	200	Unify	25	2%	-8%	54%	(2.40)				114	UNFY	11	138	-20%	-12%	$179,710	29%	23%	1980
191	186	Artisoft	25	-25%	-22%	25%	(2.90)				54	ASFT	19	110	-59%	-24%	$225,455	27%	29%	1982
192		Sync Research	25	7%	5%		(15.40)				13	SYNX	14					31%	30%	1982
193		Isocor	23	6%	34%		(6.20)				62	ICOR	10							1991
194	197	Castelle	22	-13%	4%		(7.50)				4	CSTL	4					12%	13%	1987
195		Tangram Enterprise Solutions	21	47%	3%	9%	1.10			5%	55	TESI	0	147	6%	11%	$140,816	35%	26%	1984
196		Spyglass	20	-4%	72%	12%	(8.02)				165	SPYG	23	127	-26%		$161,339	64%	45%	1990
197	180	ON Technology	20	-52%	20%		(0.20)				20	ONTC						30%		1985
198		Develcon Electronics	19	2%	12%	58%	(4.77)				N/A	DLC		130	-7%	8%	$147,692	18%	18%	1982
199	199	SBE	19	-24%	-7%	5%	0.40		-30%	2%	17	SBEI	3	65	-29%	-15%	$292,308	12%	21%	1961
200		Vertel	18		-5%		7.00	-87%		39%	43	VRTL	20					33%	39%	1985

Fiscal year ends	Web address	Chair	CEO	President	Products and services	Notes
6/30	eicon	Peter Brojde	Peter Brodje	Peter Brodje	Desktop/server integration, information access solutions	
12/31	mindspring	Charles Brewer	Charles Brewer	Michael McQuary	Internet access services, dial-up and Web hosting	
7/31	procom	Alex Razmjoo	Alex Razmjoo	Alex Razmjoo	CD arrays, CD digital linear tape, CD-ROM	
12/31	rainbow	Walter Straub	Walter Straub	Walter Straub	Cryptographic, Internet, satellite and telecom security	
12/31	ncd		Bob Gilbertson	Bob Gilbertson	Network computing products	
6/30	premisys	Raymond Lin	Nicholas Williams	Nicholas Williams	Integrated access solutions	
12/31	tnsi		John McDonnell	John McDonnell	Data communications networks, transport services	
12/31	axent	John Becker	John Becker	Brett Jackson	Enterprisewide information security	
12/31	brooktrout		Eric Giler	Eric Giler	Software communications/systems, PC boards, fax boards	Subsidiary of Brooktrout
12/31	davox	Alphonse Lucchese	Alphonse Lucchese		Call-center management software	
12/31	concentric	Henry Nothhaft	Henry Nothhaft	Henry Nothhaft	VPNs, dedicated access, Web hosting, digital subscriber line	
12/31	avtc	Dick LaPorte	Dick LaPorte	Randy Ottinger	Unified messaging, call-center solutions, network faxing	Formerly Applied Voice Technology
12/31	infoseek	Steven Kirsch	Harry Motro	Harry Motro	Internet navigation	FY98 data based on Jan-Sept. 1998 and first quarter 1999
10/31	centigram	Dean Morton	Robert Puette	Robert Puette	Voice, fax, data and e-mail messaging	
12/31	apexpc		Kevin Hafer	Kevin Hafer	Console switching systems for client/server environments	
12/31	banyan	William Ferry	William Ferry	William Ferry	Network enterprise directory technology/solutions/services	
12/31	ods	Ward Paxton	Ward Paxton	Ward Paxton	Network and data security solutions	Formerly Optical Data Systems
12/31	larscom	Paul Graf	George Donohoe	George Donohoe	High-speed WAN access equipment	
12/31	netmanage	Zvi Alon	Zvi Alon	Zvi Alon	Software for connecting PCs to midrange, mainframe and Unix	
12/31	comsystems	Curtis Sampson	Curtis Sampson	Curtis Sampson	Hubs, switches for local networking	Acquired Transition Networks in fourth quarter 1998
12/31	edify	Jeffery Crowe	Jeffrey Crowe	Jeffrey Crowe	Self-service software products via the Internet, intranets	
12/31	bocaresearch	Robert Ferguson	Anthony Zalenski	Anthony Zalenski	Modems, thin-client/server computing devices, I/O cards	Acquired Global Village Communications in June, 1998
12/31	iphase	Stephen Polley	Gregory Kalush	Gregory Kalush	High-performance server connectivity	
12/31	real	Rob Glaser	Rob Glaser		Real-time media over the Internet	
3/31	peregrine		Alan Hunt	Alan Hunt	Enterprise service desk software	
12/31	openmarket	Shikar Ghosh	Gary Eichhorn	Gary Eichhorn	Internet commerce, information management	
12/31	dlink	Ken Kao	Roger Kao	Roger Kao	Networking	D-Link Corp. subsidiary (Taiwan)
12/31	zoomtel	Frank Manning	Frank Manning	Frank Manning	Fax modems, routers, digital cameras, dialers	
6/28	emulex	Fred Cox	Paul Folino	Paul Folino	Communications servers, WAN adapters, Fibre Channel hubs	
6/30	mobius	Mitchell Gross	Mitchell Gross	Mitchell Gross	Document storage and retrieval software	
7/31	lycos		Robert Davis	Robert Davis	Online media services	FY98 loss includes $91 million in one-time charges
6/30	acti	Andre de Fusco	Andre de Fusco	Andre de Fusco	Multiservice access products	
12/31	dl	Vinita Gupta	Vinita Gupta	Vinita Gupta	Data communications access products	
12/31	centurasoft	Scott Broomfield	Scott Broomfield	Scott Broomfield	Web and client/server application development tools	Shows market cap on April 14, 1999
12/31	exodus.ne	K.B. Chandrasekhar	Ellen Hancock	Ellen Hancock	Internet server hosting and access, system management services	
3/31	interleaf	Rory Cowan	Jaime Ellertson	Jaime Ellertson	Enterprise software solutions for content management	Figures in Canadian currency
6/30	verilink		Leigh Belden	Leigh Belden	Integrated access devices, T-1/E-1 multiplexers, DSU/CSUs	
9/30	asante	Wilson Wong	Wilson Wong	Wilson Wong	Hubs, switches, adapter cards, net management	
9/30	architel		Tony van Marken	Tony van Marken	Telecom operations support systems	Formerly First Virtual, went public in May 1998
12/31	broadvision	Pehong Chen	Pehong Chen	Pehong Chen	Online relationship management enterprise software	
12/31	proxim	David King	David King	David King	Wireless LANS	
12/31	fvc	Ralph Ungermann	Richard Beyer	Richard Beyer	Video networking	
12/31	cylink		William Crowell	William Crowell	Enterprise information security, wirelesss telecommunications	
12/31	concord	Jack Blaeser	Jack Blaeser	Jack Blaeser	Web-based net performance and reporting and analysis	Canadian company. Figures in Canadian currency
5/31	verity		Gary Sbona	Gary Sbona	Search software	
12/31	bbt	John Hutchins	David Orr	David Orr	Integrated network access platforms	
12/31	memotec	Richard Drouin	Henry Epstein	Henry Epstein	Integrated solutions for WANs, data/voice communications	
12/31	iss.net	Thomas Noonan	Thomas Noonan	Thomas Noonan	Adaptive network security	
12/31	equinox	William Dambrackas	William Dambrackas	William Dambrackas	Serial I/O products, terminal servers, data switching systems	
12/31	pt		Don Turrell	Don Turrell	Network systems, data communications adapters, controllers	
6/30	interlink		A. J. Berkeley	A. J. Berkeley	Network transport products/systems mgmt. applications	
9/30	seeq	Alan Gregory	Phil Salsbury	Phil Salsbury	Data communications, semiconductor products	
12/31	npix		William Rosenberger	William Rosenberger	Network adapters, Ethernet and Fast Ethernet switches	
10/31	mlog		Richard Thompson	Richard Thompson	Call-center integration, Web integration	
9/30	netopia	Reese Jones	Alan Lefkof	Alan Lefkof	Internet connectivity, collaborative software, LAN products	
4/30	unify		Reza Mikailli	Reza Mikailli	Client/server development environment, RDBMS and 4GL	
6/30	artisoft	Michael Downey	T. Paul Thomas	T. Paul Thomas	Networking, remote communications, computer telephony	
12/31	sync	Greg Reyes	Richard Martin	Richard Martin	WAN access and management networking products	
12/31	isocor		Paul Gigg	Paul Gigg	Internet software	
12/31	castelle	Arthur Bruno	Roy Prasad	Roy Prasad	Print/fax servers, e-mail and gateways	
12/31	tangram	Charles Root	W. Christopher Jesse	W. Christopher Jesse	Enterprisewide asset tracking/asset management	Canadian company
9/30	spyglass		Douglas Colbeth	Douglas Colbeth	Internet technology software and services	
12/31	on	William Hulley	Herman DeLatte	Herman DeLatte	Enterprise client management software	Formerly Retix
8/31	develcon		Geoff Bennett	Geoff Bennett	Access routers, LAN/WAN connectivity products	
10/31	sbei		William Heye	William Heye	Connectivity and applications solutions	
12/31	vertel		Bruce Brown	Bruce Brown	Telecom management	

A tale of t

East and West Coast companies have corporate cultures that are as different as the physical locations they occupy. How does geography affect a company's culture, policies and — ultimately — its success?

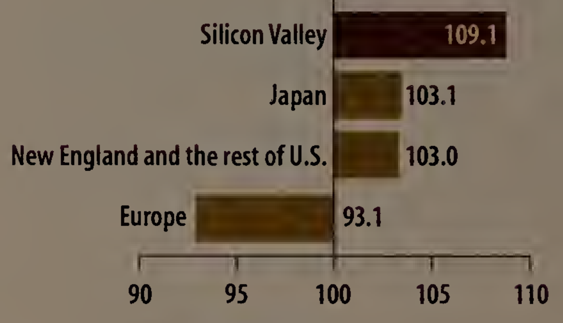
BY JULIE BORT

Two network managers walk into a restaurant. One orders clam chowder and black coffee. The other orders an avocado and sprout sandwich and a latte. Can you tell who is from Boston and who is from Palo Alto?

We bet you can, because each area of the country has its own culture, reflected in food preferences, word choices and, in the business world, management styles. Such differences are perhaps most pronounced between the East and West Coasts. Because most of the nation's high-tech companies are concentrated in Silicon Valley and New England, regionalism becomes a particular issue for the IT industry.

"When a West Coast company is dealing with an East Coast company, it may feel like a foreign country. There are real and distinct cultures," says Jessica Lipnack, co-author of *Virtual Teams: Reaching Across Space, Time, and Organizations with Technology* and co-CEO of NetAge, a West Newton, Mass.-based software vendor and consultancy. "There are different presumptions about what is fair, what trust is."

AVERAGE ORGANIZATIONAL IQ: SELECTED AREAS



SOURCE: ORGANIZATIONAL IQ

For instance, what if a long-time employee quits a job at a large corporation to work for a prospective customer? Chances are, a Silicon Valley employer would consider the person a friend, but a New England firm would label him a traitor, Lipnack says.

Issues of trust are tiles in the larger mosaic of management styles. The coasts have vastly different characteristics when it comes to definitions of competitors, the acceptable treatment of employees and the sacredness of information. These differences are sure to clash whenever a person in one region needs to manage someone in another, says Fred Townsend, president of the Silicon Valley Computer Society and an engineer for Luxtron, a Santa Clara, Calif., manufacturer at which he manages bicoastal virtual teams.

Authors of *Survival of the Smartest* contend that Silicon Valley's management style makes the region's firms more successful than their New England counterparts. The book, based on an international survey of hardware vendors conducted by Stanford University in California and Augsburg University in Germany, identifies five areas of success that make up a so-called Organizational IQ. The components are:

- External information awareness — does the company watch its competitors and its market well?
- Effective decision architecture — are decisions being made by the most knowledgeable people?
- Internal knowledge dissemination — do all employees get the information they need when they need it?
- Organizational focus — has the company created a reasonable scope of work for itself?
- Information-age business network — does the firm have the right business partnership for its scope of work?

As a whole, Silicon Valley firms scored better than companies in any other region of the world (see graphic, this page), says Johannes Ziegler, the book's co-author and founder of Synesis, a Palo Alto consulting firm that teaches Organizational IQ principles. West Coast vendors were more likely to score high in areas related to information sharing, such as external information awareness.

Johannes Ziegler, co-author of *Survival of the Smartest*, says Silicon Valley firms are organizationally the smartest companies in the U.S.

vo regions

“On the East Coast, managers would know market share — which is pretty public information — but not, say, unit costs. Managers in Silicon Valley were more likely to know that type of data,” Ziegler says.

The research in *Survival of the Smartest* isn’t the only to show that Silicon Valley has an edge. Some 55 Silicon Valley companies appear on the Network World 200 list, compared with 17 New England companies. That means Silicon Valley firms comprise 28% of the NW200 and New England firms just 9%.

MORE ONLINE: **Share your tales of working with (or for) East and West Coast vendors. Go online to our NW200 minisite, DocFinder: 2702.**
www.nwfusion.com/nw200

In 1994, Harvard University Press published a groundbreaking book, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128.* In it, author AnnaLee Saxenian argues that Silicon Valley’s edge is an open, decentralized and cooperative corporate culture, while New England tends to rely on an autocratic, independent and self-sufficient style. “The differences run deeper than just attitudes and culture to the way firms or institutions are organized in the two places,” Saxenian says.

“Collegiate” is how John McHugh, general manager of Hewlett-Packard’s ProCurve Networking Business in Roseville, Calif., describes the West’s corporate culture. HP is generally acknowledged as one of the founders of Silicon Valley and its decentralized management style.

West Coast companies tend to be less structured and are rarely driven from the top, McHugh says. But with East Coast firms, which generally have a more clearly defined hierarchy, “If you’re run by one individual and you get off track, you’re in trouble,” he says.

Likewise, Lipnack attests to New England’s staunch self-sufficiency. Four years ago, she helped form MassNEt, the New England incarnation of the Joint Venture Silicon Valley Network. But MassNEt never took off — it was impossible to get companies to work with firms outside their niche, she says.

Regional cooperation isn’t completely unheard of in New England today, but there’s plenty of room for improvement. Large companies have begun to consort on a curriculum for local schools. “Sometimes we are so competitive that we miss opportunities to collaborate, but we’re trying to address that,” says Ken Moekler, director of worldwide staffing for EMC in Milford, Mass.

Meanwhile, Joint Venture lords over five initiatives and collaborates with four affiliated professional organizations.

In all fairness, New England has a double hurdle when it comes to collaboration. Not only does the region culturally resist the notion, but it’s also more industrially diverse than Silicon Valley. While technology isn’t the Valley’s only industry, it is the dominant one. With everyone in the Valley speaking the same digital language, cooperating is that much easier.

JUST A NANOSECOND

Yet New England has something Silicon Valley desperately needs: history. In more than 200 years of being an economic center, New England has learned a crucial lesson — when one opportunity runs out, another appears. So even though those in the East are every bit as determined to succeed as their West Coast counterparts, they don’t seem as manic about it.

Dealing with a company from the opposite coast can be akin to working with a foreign country, says Jessica Lipnack, co-CEO at NetAge.

SHAWN HENRY

If self-sufficiency is New England’s hubris, then entrepreneurial spirit is certainly the Valley’s. Like the microchip that spawned the area’s high-tech industry, the speed of business in Silicon Valley increases exponentially every year. For instance, the 50 fastest growing companies in 1998 grew at least 650% and averaged a five-year growth rate of 3,319%, according to Joint Venture’s annual list.

Things are taken to an extreme in the Valley. “We tend to focus on a few things excessively,” says Beau Vrolyk, senior vice president of the computer systems business unit for Silicon Graphics in Mountain View, Calif. People work 16 to 18 hours per day; Vrolyk says it’s not uncommon for him to hold a mandatory meeting at 9:30 p.m.

Such an attitude is appalling to many New Englanders and downright abusive to employees in other areas of the country, such as the Midwest. The pace is also a hardship for those living it.

“There’s a reason why the divorce rate is high in California. We tend to work people for 25 days straight and then wonder why they don’t make good decisions,” Vrolyk says. “Midwesterners who go home at 5:30 aren’t goofing off, and they may be even more productive because they’ve gotten enough sleep.”

Because of the work-till-you-drop culture, seemingly insignificant items can become disproportionately important in Silicon Valley, says

Piyush Patel, senior vice president of engineering for Cabletron in Rochester N.H. and former CEO of YAGO Systems in Sunnyvale, Calif. For example, when Cabletron purchased YAGO last year, it tried to halt YAGO's practice of providing free snacks for employees. Near mutiny ensued on the West Coast, and Cabletron bowed to the pressure.

"Cabletron recognized that we had to run our division independently, like the free snacks. It seemed like a small thing, but it became a religious issue," Patel laughs. "For us, free snacks make sense. You don't want your engineers to take a break and go out."

Perhaps one of the biggest by-products of the Valley's excessive growth is an out-of-control cost of living. Affordable housing in the San Francisco Bay area simply doesn't exist. As of the fourth quarter of 1998, the median cost of a home in San Francisco was $325,800, according to the National Association of Realtors. The pricey real estate pushes Valley workers into houses outside the Bay area, then makes them tackle tremendously long commutes.

"You see people doing 200-mile-a-day commutes. To tell people they have to be here at 8 a.m. or they'll be frowned upon is ridiculous," Luxtron's Townsend says. "I've got programmers who don't come in until noon and stay past midnight."

Little things can mean a lot to Silicon Valley workers, says Piyush Patel, senior vice president of engineering at Cabletron.

SHAWN HENRY

Flex time and telecommuting make management more difficult, so managers rely more heavily on e-mail and less on face-to-face meetings.

With a median home cost of $214,900 in Boston, New England housing is expensive, too. However, workers can find relatively affordable homes within a 30-minute commute. Options are even better in the suburbs, where companies such as EMC are located.

Why, then, with the labor shortage so intense, would Silicon Valley workers put up with such long hours and the high cost of living? For some, it's a sense that the Valley is the hot spot for an IT career. For others, it's the allure of cashing in on a successful start-up.

In the long run, both coasts could stand to learn from one another. The West teaches that sharing is good for everyone, and the East teaches that speed isn't the only factor in success. ▲

COASTAL CHARACTERISTICS

You know you're dealing with an East Coast company when:

- The company wants to be considered "global" rather than from New England.
- Employees arrive at 8:29 a.m. and leave at 5:56 p.m.
- Meetings are face-to-face gatherings of two or more people in a single room.
- Coffee is paid for by the company and bought in bulk at a warehouse club.
- The break room always has the latest copies of *The Wall Street Journal* and *The New York Times*.

You know you're dealing with a West Coast company when:

- The company says it's located in "the Valley."
- Meetings are when two or more people are "cc'd."
- Employees arrive sometime before noon and leave sometime before dawn.
- Only Starbucks coffee can be found.
- The break room always has the latest copies of *The Wall Street Journal* and *The New York Times*, free snacks and seven kinds of herbal tea.

Actual size.

Rainbow Technologies Introduces The World's Smallest Security Force.

iKey is a portable security token that delivers strong two-factor authentication. It protects VPNs and controls access to extranets, intranets and the Internet.

The iKey™ security token ensures secure network access. It uses its cryptographic processor and memory for strong two-factor authentication that guards and protects access to corporate intranets, extranets, VPNs and the Internet.

iKey is universal. Because it's designed for USB ports, iKey is compatible with all popular computing platforms, standard Internet protocols and security protocols. It also meets current authentication standards.

iKey is simple to use. Just insert it into a computer's USB port and enter a PIN number.

iKey is small and portable. Users can securely access networks from anywhere in the world.

iKey is inexpensive. It's a cost-effective security tool that adds value to your products.

And, when used with NetSwift™ and CryptoSwift™ accelerator cards, iKey becomes part of Rainbow Technologies' comprehensive solution for increasing network security and performance.

CryptoSwift provides public key cryptographic SSL and TLS acceleration for enterprise, Web and directory servers.

CryptoSwift public-key cryptographic accelerator card

In applications like e-commerce, CryptoSwift products remove the encryption burden from the server, processing up to 600 transactions per second. This improves server response time up to 90% while improving server capacity tenfold.

As the leader in security technology, Rainbow Technologies helps you add more value to your products.

NetSwift VPN cryptographic accelerator card

NetSwift provides VPN cryptographic acceleration for gateways, routers, switches, firewalls and other devices. This allows network equipment to operate at line speeds.

NetSwift accelerates tunneling protocols, allowing VPNs to operate at line speeds.

For more information, visit our Web site: http://www.rainbow.com/nw

RAINBOW TECHNOLOGIES

Changing the way the world secures business.

50 Technology Drive, Irvine, CA 92618 800.852.8569 tel. 949.450.7300 fax 949.450.7450

© 1999 Rainbow Technologies, Inc. iKey, CryptoSwift and NetSwift are trademarks of Rainbow Technologies, Inc. All other product names are trademarks of their respective owners.

Free Product info enter NWInfoXpress #108 online @ **www.networkworld.com/infoxpress**

The Billion Dollar Club

Some top Network World 200 companies have stockpiled cash reserves that would make any miser proud. But could they be putting their money to better use?

BY JULIE BORT

In the 1861 classic English novel *Silas Marner,* George Eliot created the archetypal money lover. Marner spent his evenings alone, in the dark, counting his hoard of gold. A look at the NW200 confirms that Marner isn't alone in his love for cash.

Specifically, 19 companies surpass $1 billion in cash assets. Nearly half of those have accumulated $2 billion or more, with Microsoft surpassing them all. The software maker has almost $14 billion cached (pun intended). Intel lands in second place with more than $7.6 billion, and IBM is in third with $5.7 billion.

When factoring in the debt of these billionaire savers, another miser appears: Novell. Novell has kept $1 billion in ready money for years now and owes virtually nothing. That kitty is just about equal to what Novell rang up in sales last year — its 1998 revenue reached $1.2 billion — and adds up to twice as much as a software company its size typically stashes. Now how many of you can manage to keep a year's wages in the bank, debt-free?

"If you look at the leading technology companies and compare, whether you're looking at cash to total balance sheet or cash to revenue, [the analysis] says we should have about $500 million in the bank," says Dennis Raney, chief financial officer of Novell. "But we have not had any negative comments about having too much."

On the contrary, Raney and analysts say. Novell's available cash has contributed to its comeback — proving to shareholders, analysts and customers that the company "had the resources to execute its turnaround plan," Raney says.

A turnaround that, by all accounts, Novell accomplished last year.

True, these stockpiles didn't sprout up overnight. Most have taken years to build, says Greg Rossman, managing director for Broadview, a Fort Lee, N.J.-based investment banking firm that focuses on technology mergers and acquisitions.

And for companies such as Novell in defensive, rebuilding modes, survival depends on "maintaining an adequate cushion to fund cash flow," says Nat Burgess, senior vice president of Corum Group, a Bellevue, Wash., software merger and acquisition boutique.

But is too much cash ever a bad thing? Well it's never actually bad, financial analysts say, but hoarding isn't the best choice.

In fact, Microsoft has taken some heat in recent months over its $14 billion in cash and liquid investments. The argument is that the company could be doing more with that money, says Michael Wieberg, equity research analyst for ING Barrings, an investment firm in New York.

Given that Microsoft doesn't pay dividends, it's a valid argument.

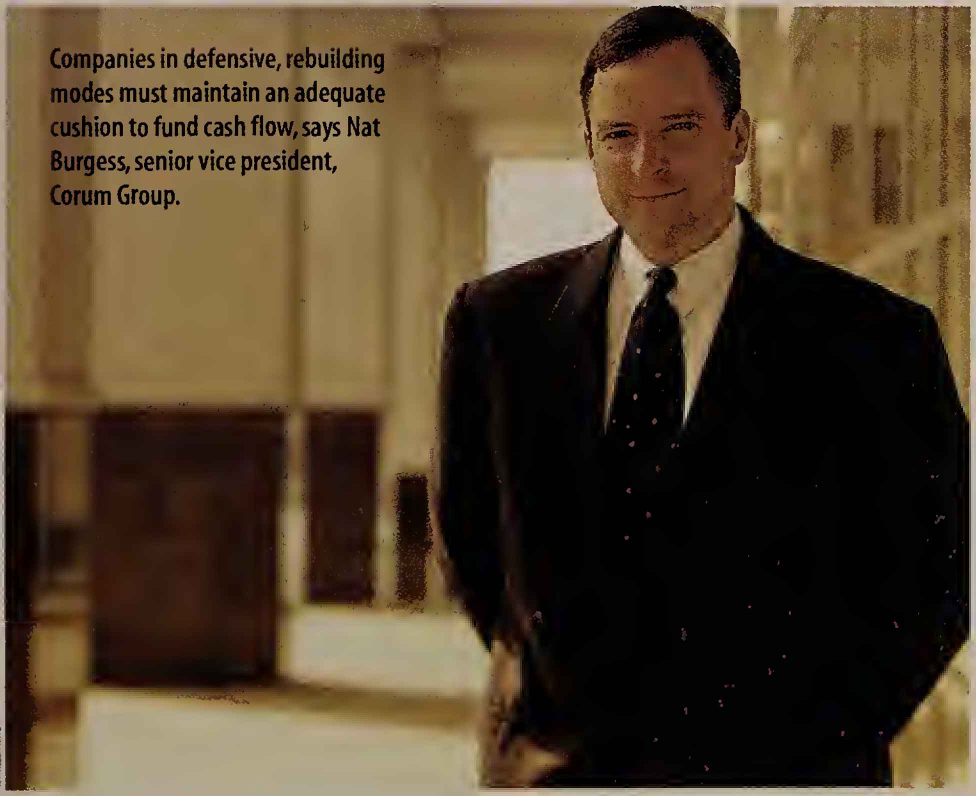
"The assumption is that a public company should put the cash to work, either in dividends or acquisitions. Microsoft should have better things to do with that money than letting it sit in the bank," Wieberg says.

What the company will spend that cash on is the question. Currently, Microsoft's major focus for the money is buying back its stock, mostly to continue offering it to employees — a huge bargaining chip in today's fight for top talent. Likewise for Novell, which is buying back 10% of its outstanding stock.

As for the rest? Some wonder if Microsoft is keeping itself ready for a large cash payout settlement that could result from its legal troubles. Maybe, but experts speculate that such a payout would hardly reach $14 billion. Or Microsoft could be banking on the possibility that the Department of Justice will break up the company, in which case its splinters would need cash to reorganize. Microsoft isn't saying.

THE LIQUID PICTURE

On the other hand, some equity experts contend that a better way to assess cash is to compare it to overall assets, rather than revenue, says Gary Wiebke, editor of the *Armchair Millionaire Investor Center*



Companies in defensive, rebuilding modes must maintain an adequate cushion to fund cash flow, says Nat Burgess, senior vice president, Corum Group.

KATHLEEN KING

Cash stockpiles don't sprout up overnight — they take years to build, says Greg Rossman, managing director, Broadview.

JASON GROW/SABA

(www.armchairmillionaire.com) and a former equity analyst with JDK Partners, both in New York.

For instance, Microsoft currently has $14 billion in cash and liquid investments and $22 billion in overall assets. While the amounts have been rising, the ratio of cash to total assets has been roughly stable. In 1997, for example, Microsoft had $9 billion in cash and $14 billion in total assets.

Moreover, Microsoft's is the fastest growing stock, so "it's hard to claim it should be doing more for its investors," contends Wiebke, adding that the company will unquestionably do something with the money. "But to second-guess Microsoft management and say it isn't doing enough — I think it has earned the benefit of the doubt."

Furthermore, Microsoft isn't really "saving." Instead, it's earning faster than it can spend. Part of that is the nature of the software business, which has very little overhead compared with other technology businesses. So the same accusations of lackadaisical money management aren't hurdled at, say, Intel with its $7.6 billion stash.

The operating costs of a semiconductor business are huge, says Greg Mischou, senior semiconductor analyst for Warburg Dillon Read, an investment banking firm in San Francisco. For instance, today's state-of-the-art fab costs $1.5 billion to build.

"In the future, the cost will go up dramatically. For a future 300-millimeter fab, the cost will exceed $2 billion," Mischou says.

Moreover, revenue streams are cyclical. A company like Intel needs to hang onto its money to pay its bills through those slow times.

As for the rest, a savvy cash-heavy company will spend on acquisitions. In fact, other than Intel's stock buyback program and operating needs, that's the target of its leftover funds.

The company's cash position lets it make acquisitions and grow new areas of business. Intel has announced a number of acquisitions in the network area — Case Technology, Dayna Communications, iCat, Level One Communications and Shiva.

The bottom line is, too much cash is a nice problem to have. ▲

NETWORK BILLIONAIRES

Nearly 10% of the companies comprising the Network World 200 keep more than $1 billion in cash or cash equivalents.

Company	Cash and cash equivalents (in billions)	NW200 rank	Stock symbol
Microsoft	$13.9	17	MSFT
Intel	$7.6	10	INTC
IBM	$5.8	1	IBM
Compaq	$4.1	5	CPQ
Hewlett-Packard	$4.1	3	HWP
AT&T	$3.2	2	T
BellSouth	$3.0	12	BLS
Apple	$2.3	28	AAPL
Oracle	$1.9	24	ORCL
Dell	$1.8	19	DELL
Cisco	$1.7	21	CSCO
Motorola	$1.6	8	MOT
EMC	$1.5	34	EMC
Nextlink	$1.5	128	NXLK
EDS	$1.3	15	EDS
Sun	$1.3	20	SUNW
3Com	$1.1	30	COMS
Bell Atlantic	$1.0	4	BEL
Novell	$1.0	59	NOVL

What do the leading network security companies all agree on?

Check Point OPSEC CERTIFIED

Authentication
ActivCard Token
AXENT Defender Security Server
Blockade Enterprise Security Server
CRYPTOCard CRYPTOServer
Funk Software Steel-Belted Radius
LeeMah DataCom TraqNet 8000
Netegrity SiteMinder
Secure Computing SafeWord
Security Dynamics ACE/Server
Vasco Corporation VACMan
Content Security
Aladdin Knowledge Systems eSafe Protect Gateway
Aliroo PrivaWall
ContentTechnologies MIMEsweeper for FireWall-1
Log On Data X-STOP for FireWall-1
NetPartners WebSENSE for FireWall-1
Secure Computing Smart Filter
Security-7 Software SafeGate
SurfWatch Software SurfWatch for FireWall-1
Symantec Norton AntiVirus for Firewalls
Trend Micro InterScan VirusWall
URLabs Inc. I-Gear
Directory Management
IBM eCommerce Directory Server
Netscape Directory Server
Novell NDS
Event Analysis And Reporting
Micromuse Netcool/FireWall-1
SecureIT Firewall HealthCHECK
SecureIT SecureVIEW
Telemate Software TELEMATE.Net
WebTrends WebTrends for Firewalls and VPNs
High Availability
Legato Systems FullTimeHA+
Marathon Endurance 4000
Nokia IP Series Router/Firewall
RADWARE RADWARE FireProof
RSi Solutions RSF-1
Stonesoft Corporation StoneBeat
Veritas Software FirstWatch
Intrusion Detection
Check Point RealSecure
ISS RealSecure
Memco SECURED for FireWall-1
Other Technology
Chrysalis-ITS Check Point Accelerator Card
RSA BSAFE SSL-C
Securely Managed Applications
BackWeb Technologies BackWeb Channel Server
Campbell Services OnTime Enterprise NT
Citrix WinFrame
e-motion Creative Partner
FreeTel Communications FreeTel Personal Edition
Microsoft NetMeeting
Netscape Communications CoolTalk
Netscape Communications Communicator
Netscape Communications Conference
Oracle Corporation SQL*NET
PointCast PointCast Network
Progressive Networks RealAudio
Sybase jConnect for JDBC
Sybase Open Client
Sybase SQL Server
VDOnet VDOLive
Vosaic Vosaic Media Suite
VXtreme Web Theater
White Pine CU-SeeMe
White Pine Reflector
Xing StreamWorks

Check Point OPSEC SECURED

Networking
FORE Systems - ESX Switches
Nokia IP Series Router/Firewall
Nortel Networks for BN and ASN
Nortel Networks for ARN and System 5000
ODS Networks
Xylan OmniSwitch and PizzaSwitch
Servers
Compaq ProLiant
Dell PowerEdge
IBM FireWall-1 for RS/6000
Hewlett-Packard NetServer
Hewlett-Packard 9000 series
NCR Corporation WorldMark Server
Sun Microsystems FireWall-1 for Sun/OS
Sun Microsystems FireWall-1 for Solaris

Check Point
OPSEC
CERTIFIED

Status symbol.

OPSEC certification by Check Point sets the architectural standard for secure enterprise networking.

When it comes to network security, you can't take chances. That's why you need to look for products and services that carry the OPSEC symbol. OPSEC compliance guarantees interoperability for all your network security needs. OPSEC (Open Platform for Secure Enterprise Connectivity) has become the de facto standard for the seamless integration of best-of-breed security products and services. Nearly 200 companies have committed to development with the OPSEC Architecture today. Which means you can choose the best solutions, secure in the knowledge that your hardware, software and services will work together to give you the highest possible performance.

CHECK POINT™
Software Technologies Ltd.

Download free evaluation software and register for a free Tech Note explaining the OPSEC Architecture today at ***www.opsec.com/ad****.*

CHECK POINT SOFTWARE TECHNOLOGIES, LTD. Check Point, the Check Point logo, OPSEC are trademarks or registered trademarks of Check Point Software Technologies Ltd. All other product names mentioned herein are trademarks of their respective owners.

Free Product info enter NWInfoXpress #69 online @ **www.networkworld.com/infoxpress**

IP APPS
YOUR NETWORK
Don't try this without our campus solutions.

Let's face it, with network traffic doubling every 12 to 18 months and Intranet services requiring more and more bandwidth, if your network doesn't adapt, it'll be squashed. Don't let that happen. Our Accelar* campus solutions deliver the versatility and reliability required to manage the convergence transition seamlessly. And set the stage for a unified telephony and data network with an evolution management platform. So don't try this with anyone but us. Come together with Accelar. **www.nortelnetworks.com/16GT**

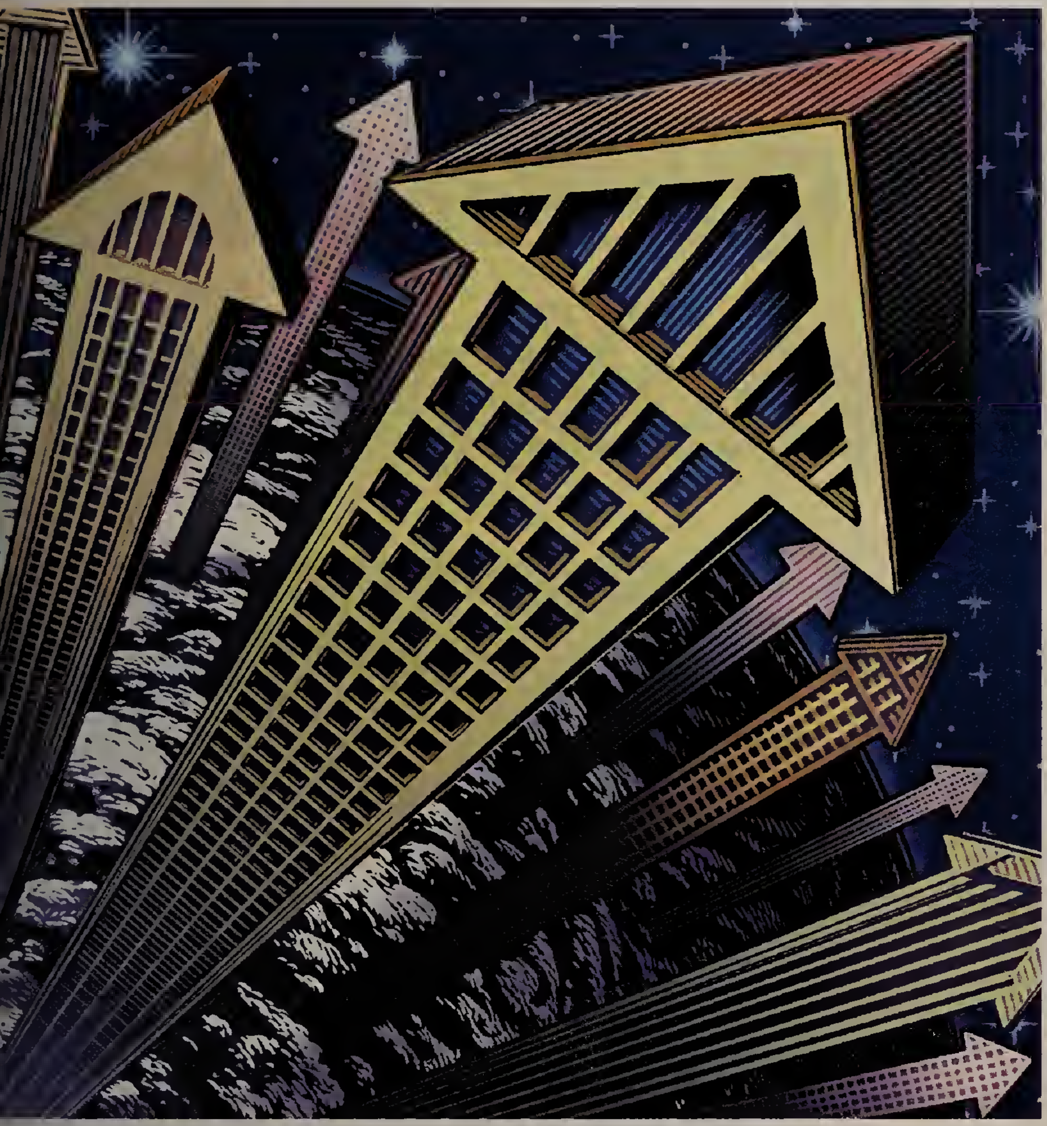
NORTEL NETWORKS™

How the world shares ideas.

*Nortel Networks, the Nortel Networks logo and "How the world shares ideas" are trademarks of Northern Telecom. Accelar is a trademark of Bay Networks Inc., a Northern Telecom company.
© 1999 Northern Telecom. All rights reserved.

Free Product info enter NWInfoXpress #78 online @ **www.networkworld.com/infoxpress**

10 Companies to Watch



These young companies could be the network stars of tomorrow.

Sometimes corporate giants can shake things up, like when IBM produced its first PC or Chrysler invented the minivan. But often it's the small fries that have the big ideas. These 10 network companies may be small, but they're pushing some hot technologies that could vault them into the big time.

OUR 1999 PICKS

Company to watch	Technology base
Akamai Technologies	Web content distribution
Bluestone Software	XML
Covad Communications	DSL
Foundry Networks	Gigabit Ethernet switching
Inktomi	Web caching
Manage.com	Web-based management
Network Alchemy	VPN server
Nextlink Communications	LMDS wireless
Red Hat Software	Linux software
Ukiah	Policy-based traffic management

Akamai controls the flow

BY BETH SCHULTZ

Hear the words "flash flood," and you'll likely envision muddied, churning waters raging out of control, wiping deep swatches across the landscape and leaving havoc in their wake.

The words "flash crowd" don't have quite the same effect — but start-up Akamai Technologies has launched a business around the belief that if one hits an unprepared Web site, the devastation could be just as dramatic for the business owner.

By Akamai's definition, a flash crowd happens when a Web site experiences an intense traffic spike correlating to an event. One infamous example is the glut of concerned citizens pounding the U.S. House of Representatives site when it posted the Starr Report.

A company can usually sense when something it plans on posting on the Web is going to draw a crowd, but it has no way to predict the onslaught's volume. That's where Akamai steps in, says David Goodtree, the company's newly named vice president of marketing.

Akamai has developed a patent-pending technology for managing traffic loads across multiple networks. Its service, called FreeFlow, pushes content as close to the user as possible by distributing it across a network of Akamai servers.

"A user might typically be one, two or three networks away from the content. With FreeFlow, if an ISP customer looks down the physical wire, the first thing he should see in the point of presence is our server," Goodtree says.

Toward that end, Akamai already has deployed 500 servers on 10 networks around the globe. By year-end, it will have 1,000 servers on 20 networks. More will follow, as quickly as the company can get them up, Goodtree says.

Akamai put FreeFlow through the wringer in beta tests involving 10 undisclosed Web content providers. During the trial, FreeFlow handled live traffic, including several flash crowds, with "aplomb," Goodtree says, noting that the beta traffic taxed only 1% of Akamai's network and that each beta user has decided to become a paying customer.

Akamai's prospects look great, says Todd Dagres, general partner at Battery Ventures, a venture capital firm in Wellesley, Mass.

"It is helping satisfy a very clear need relative to how Web-centric companies deliver content over the Internet," he says.

AKAMAI TECHNOLOGIES

Headquarters: Cambridge, Mass.

Contact information: (617) 250-3000; www.akamai.com

Products: FreeFlow Internet content distribution service

Executive team: George Conrades, chairman and CEO; Paul Sagan, chief operating officer

1998 revenue: None (start-up)

Fun fact: Akamai is a Hawaiian word meaning intelligent and clever. Informally, it means "cool."

What's more, Akamai has an impressive management team behind it, Dagres adds. The team is led by George Conrades, who became chairman and CEO earlier this month. In various corporate lives, Conrades launched IBM's services business, led the commercialization of BBN's research and development business, and then oversaw the integration of GTE's Internet and data communications activities following the BBN acquisition.

Akamai has $8 million in initial funding, led by Battery Ventures and Polaris Venture Partners. The company is closing its second round of financing this month, so "it will have a large war chest," Dagres says.

With such backing, Akamai's sure to be more than just a flash in the pan.

Bluestone's XML-ent future

BY ROBIN SCHREIER HOHMAN

Bluestone Software sells Web application servers, certainly not the sexiest of Internet technologies but most assuredly where some big money is.

BLUESTONE SOFTWARE

Headquarters: Mt. Laurel, N.J.

Contact information: (609) 727-4600; www.bluestone.com

Products: Sapphire/Web application server; XML-Server; XwingML; Visual XML

Executive team: Mel Baiada, founder and chairman of the board; Kevin Kilroy, president

1998 revenue: Estimated $18 million

Fun fact: In its early, lean years, Bluestone recognized employee achievement with a monthly award of an empty floppy disk box. Today, the tradition has evolved into a 3.5-in. floppy disk with a personalized label signed by Baiada.

The application server market nearly tripled from about $150 million last year to $412 million this year, according to a survey by Forrester Research. Even better, Forrester is predicting that the market will grow fivefold by 2002, to $2.1 billion.

With Sapphire/Web, an application framework that shepherds data from back-end systems to the new world of the Web, and XML-Server, which translates nearly any kind of data into Extensible Markup Language (XML), Bluestone is poised for growth, analysts believe.

Bluestone Software makes our list of companies to watch on the strength of its products and its vision.

When Sapphire/Web was launched four years ago, the company was ahead of the pack with its Web focus. Last year, Bluestone was again on the cutting edge, this time with XML-Server, part of a new class of application servers made to produce, transport or store XML documents.

Bluestone's XML-Server is unique because it dynamically translates non-XML data into XML. That ability helps make back-end business applications and data available for e-commerce and other Internet applications.

The company also has marketing savvy, releasing innovative, affordable tools to broaden XML's appeal, such as Visual XML, a tool kit for building XML applications.

Last month, Kevin Kilroy celebrated his one-year anniversary as Bluestone's president. He was promoted from vice president of sales in March 1998 with the goal of getting the word out about Bluestone.

"At that time, Bluestone had a fifth-generation product, but no mind share," he says.

Kilroy, along with key employees hired away from the likes of Oracle, SAP and Platinum Technology, earned Bluestone a 426% increase in licensed sales last year. Kilroy expects sales to double this year. How much money that increase represents is not something the otherwise talkative Kilroy is willing to discuss, blaming his silence on the quiet period demanded by Bluestone's upcoming public offering.

In the coming year, Bluestone will emphasize personalization and content management, Kilroy says. He also expects the company to continue

Available now from APC!
that costs 20 percent

New APC NetShelter®

Installing high performance servers without the proper power protection is costly. According to Contingency Planning Research, power failures and surges account for 45% of all data loss. In high availability environments, that's unacceptable risk.

Why not give yourself a break? Bad power should be the last thing you have to worry about.

When you install your new server, wrap it up in the best armor available: APC NetShelter rack enclosure with APC Smart-UPS® power protection.

Visit *http://promo.apcc.com* and enter to win a FREE 42U NetShelter enclosure. Call your authorized APC Reseller and begin experiencing APC's Legendary Reliability™ today!

"APC proved to me that NetShelter® is one great product."

Smith Wimberley, Senior Administrator
US District Court, Eastern Texas

"I knew from firsthand experience that APC was the best UPS company in the business, and there was no hesitation in my mind as to who would protect our servers."

Howard Forrester, President, Forrester Consulting Group, Inc.

Enter to win a FREE 42U NetShelter at *http://promo.apcc.com* Key Code j878z or call 1-888-289-APCC ext. 7550 For complete details see the web entry site

©1999 APC All Trademarks are the property of their owners. NS1B9ES-US • PowerFax (800)347-FAXX • E-mail: netshelter@apcc.com • 132 Fairgrounds Road West Kingston RI 02892 USA

Enter to win a 42U NetShelter today!

Just mail or fax this completed coupon to participate in the FREE NetShelter drawing. Better yet, try it today at the APC Web site!

KEY CODE j878z

http://promo.apcc.com

(888) 289-APCC x7550 • FAX: (401) 788-2797

APC

Legendary Reliability™

☐ YES! Please enter me in the FREE NetShelter drawing.

☐ NO, I'm not interested at this time but please add me to your mailing list.

APC NetShelter®

Name: ____________________

Title: ____________________ Company: ____________________

Address: ____________________

City/Town: ____________________ State: __________ Zip: __________ Country __________

Phone: ____________________

Brand of UPS used? ____________________ # __________

Brand of PC used? ____________________ # __________

Brand of Servers used? ____________________ # __________

©1999 APC. All Trademarks are the property of their owners. NS1B9EB-US • E-mail: netshelter@apcc.com • 132 Fairgrounds Road, West Kingston, RI 02892 USA

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 36 WEST KINGSTON, RI

POSTAGE WILL BE PAID BY ADDRESSEE

APC
AMERICAN POWER CONVERSION
KEY CODE: j878z
Department: B
132 FAIRGROUNDS ROAD
PO BOX 278
WEST KINGSTON RI 02892-9920

How to Contact APC

Call: (888) 289-APCC
use the extension on the reverse side

Fax: (401) 788-2797

Visit: ***http://promo.apcc.com***
use the key code on the reverse side

APC
Legendary Reliability™

growing; so far, the head count hovers around 160.

One caveat: XML is still young, and analysts don't expect the market to grow appreciably this year. Still, with companies such as Dreyfus Service Corp.; Conexant, formerly Rockwell Semiconductor System; and MCI WorldCom signing on to Sapphire/Web, the company might be able to afford the wait.

Covad: Be ready for DSL

BY TIM GREENE

Covad Communications' digital subscriber line (DSL) network business could explode this year.

After much preparation, the company finally has what it needs to deliver broadband Internet and corporate access over regular phone lines:

- It methodically did the grunt work of winning state-by-state competitive local exchange carrier status, approval it needed to lease phone lines from traditional local carriers, the regional Bell operating companies.
- It leased space for its DSL gear in RBOC switching offices.
- It formed alliances with ISPs and phone companies that will resell Covad DSL services.
- It issued public stock, pulling in the money it needs to finance its service rollout.

Perhaps its greatest achievement so far is lining up AT&T as an investor — $25 million — and a reseller of Covad DSL services, according to Eric Paulak, an analyst for Gartner Group, a consultancy in Stamford, Conn. Covad's TeleSpeed services give customers access to the Internet or corporate networks at speeds between 144K bit/sec and 1.5M bit/sec.

COVAD COMMUNICATIONS

Headquarters: Santa Clara, Calif.

Contact information: (408) 844-7500; www.covad.com

Products: TeleSpeed DSL service

Top executive: Robert Knowling, president and CEO

1998 revenue: $5.3 million (first full year offering services)

Fun fact: Before settling on the the name Covad, company founders Chuck McMinn, Chuck Haas and Dhruv Khanna referred to their organization as "three guys with cell phones."

In addition, Covad has signed up other key service providers, Qwest Communications and Concentric Networks among them, as investors and resellers.

In 1996 when the company was formed, Covad took one look at DSL technology and saw what it could mean for businesses: fast, inexpensive access to corporate networks and the Internet using regular phone lines.

It decided to forego the feature that allows an analog voice channel on the same line as the DSL datastream because it thought business customers did not need it. Covad also focused on DSL flavors that provide symmetric bandwidth, even though asymmetric varieties offer higher speeds in one direction. Business customers want to send and receive at roughly the same speeds, Covad thought.

So far, the company's analysis has won broad support among others in the industry. And last year, Covad's first full year offering services, it took in $5.3 million in sales — with services available in only seven cities.

The rollout so far gives the company access to six million potential customers. And the company has announced plans to sell DSL in 22 cities by the end of the year.

While it is enjoying success, Covad is being pursued by some formidable opponents that also bear watching, including NorthPoint Communications and Rhythms Netconnections.

But with the focus, funding and execution it has shown so far, Covad should be around for the long term.

A rack-mount solution less than Compaq

APC NetShelter

- ✓ Supports IBM, Compaq, HP, Dell and other leading brands
- ✓ Roof mounted fan tray for proper ventilation
- ✓ Environmental monitoring of remote sites enhances uptime
- ✓ Power management software integrates with all leading enterprise management platforms
- ✓ SmartSlot™ Triple Chassis™ accommodates multiple SmartSlot adapter configurations
- ✓ MasterSwitch™ controller can reboot remote equipment
- ✓ Accessories include cable management arm, 17 inch keyboard and sliding shelves and many more

"Add to this APC's incredibly responsive service, and we feel we have a very strong insurance policy against system failure."

Tony Castellano, IT Manager, Enterprise Applications, Cambridge Technology Partners

Available now at an unbeatable price!

$2,059 list price

APC
Legendary Reliability™

Free Product info enter NWInfoXpress #67 online @ www.networkworld.com/infoxpress

Foundry turns on switching

BY JEFF CARUSO

Foundry Networks is what you might call LAN hardware's dark horse.

Its Layer 3 switches may not have the flash of Extreme Networks' purple boxes, and the company may not have the marketing muscle of Cisco, but Foundry has been quietly winning users with its products' low prices, high performance and range of features.

Foundry's switches make forwarding decisions at Layer 2, 3 or 4, and send data over Fast Ethernet and Gigabit Ethernet. The company has more than 600 customers today, and it is profitable — a rarity among the Gigabit Ethernet start-ups that have come and gone in the past few years. Most of those start-ups have been swallowed up by other companies.

FOUNDRY NETWORKS

Headquarters: Sunnyvale, Calif.

Contact information: (408) 731-3800; www.foundrynet.com

Products: FastIron workgroup switch; ServerIron server switch; BigIron enterprise chassis switch

Top executive: Bobby Johnson, CEO

1998 revenue: Undisclosed

Fun fact: Johnson buys the whole company dinner every night to keep them working late.

Rival Extreme has garnered much attention since it filed for an initial public offering in January, but all eyes will shift to Foundry as it files for its IPO. CEO Bobby Johnson says such an offering is imminent, although Foundry hadn't gone public by press time.

The company will also keep the heat on as it expands its product line over the next year. Foundry's flagship BigIron switch will get new WAN and copper-based Gigabit Ethernet interfaces next month, and Foundry will raise the capacity of its switches with wave division multiplexing later this year.

The U.S. Army's Redstone Arsenal revamped its network with Foundry switches last year, moving from a mix of switched and shared Ethernet to Gigabit Ethernet and Fast Ethernet switches.

"The bandwidth is incredible," says Bob Nance, network administrator with Amtec, which contracts with the Huntsville, Ala., arsenal.

Inktomi caches on

BY JULIE BORT

To the Lakota Indians, the name "Inktomi" summons the legend of a trickster spider that defeats larger adversaries through wit and cunning.

In a Web of a different kind, Inktomi is outwitting its competitors with caching technology, which is slightly more than 6 months old.

Inktomi enters our 10 companies to watch list for its Traffic Server, which has already snared such service providers as America Online, Intermedia Communications' Business Internet and @Home Network. The company also aims the carrier-class gear at big U.S. enterprise companies.

AOL apparently likes what it sees.

"We are always looking to bring the very best Web experience to our members, and Inktomi's Traffic Server really helps us do that," says Wendy Goldberg, vice president of communications for AOL.

In fact, that "best experience" is measurable. In a recent shootout of Web-page speed, AOL led a pack of 28 ISPs with an average time to download of 27.64 seconds. The runner-up, BellSouth, had a download time of 30.43 seconds. Inverse Network Technology, a benchmarking service in Sunnyvale, Calif., conducted the tests.

Traffic Server has this effect thanks to its custom thread- and event-scheduling system and an object database that can cache large numbers of Web objects. Traffic Server supports Cache HTTP 1.1 and is one of the only caching products that supports audio, streaming video, Usenet news and Network News Transfer Protocol content.

Caching is a market ripe for picking, says ISP analyst Greg Howard of the High-tech Resource Consulting Group in San Jose. His research shows that more than half of the country's national ISPs plan to implement caching technology to increase network performance. Their vendor choice? Inktomi, he says.

Inktomi started in the ISP market with its well-regarded outsourced search engine service. At the root of the service is Inktomi's homegrown clustering technology, which aggregates low-cost, off-the-shelf workstations and PCs into a massive parallel computer.

INKTOMI

Headquarters: San Mateo, Calif.

Contact information: (650) 653-2800; www.inktomi.com

Products: Traffic Server, Search Engine, Shopping Engine

Top executive: David Peterschmidt, chairman and CEO

1998 revenue: $20.4 million

Fun fact: Inktomi was founded by two University of California, Berkeley, researchers who were working on a federally funded project to achieve supercomputer might at desktop prices.

Traffic Server grew out of Inktomi's clustering experience because caching requires knowledge of the Internet, traffic volumes and parallel computing.

ENTERPRISE AHEAD

Inktomi is using Traffic Server to attack the global enterprise market, particularly companies with their own carrier-class, mission-critical networks. It is, therefore, selling the product via a traditional software licensing model, in which price is negotiated case by case, says Paul Gauthier, chief technology officer and co-founder of Inktomi.

The business plan may prove to be a winner, too. As of fourth-quarter 1998, Inktomi has been generating roughly half of its revenue through Traffic Server, with the remainder coming from its outsourced search engine services. Better still, revenue is growing at a rate of 343%, to $20.4 million, according to the company's last quarterly statement, released in January. And Inktomi has been a darling of Wall Street in the past year, despite consistent losses.

Next up for Inktomi is shopping search engine services that the company will outsource to its portal customers in the same manner it outsources Web page queries. CNNfn.com has already signed up for the service for its newly launched CNNfn Power Shopper.

Manage.Com has Web flair

BY JEFF CARUSO

Few vendors have championed Web-based management like Manage.Com.

The company has ridden the wave of excitement surrounding Web technology, creating software that lets net managers view the layout of their networks on a Web browser from any point on the network.

MANAGE.COM

Headquarters: Santa Clara, Calif.

Contact information: (888) 567-9990; www.manage.com

Products: FrontLine Manager network management software

Top executive: Jeff Thiemann, CEO

1998 revenue: Undisclosed

Fun fact: Manage.Com has taken its "E-management for E-business" motto to heart, renaming its own internal departments "E-sales," "E-marketing," E-etc.

Manage.Com's FrontLine Manager is aimed at mid-size companies at which users have outgrown simple LAN management, yet don't require something as complex and expensive as major network and systems management platforms. FrontLine Manager is striking a chord with some users.

"A lot of the software we had in the past was hard to use," says Robert Zeien, a network engineer at Stanford University Medical Center and an early user of FrontLine Manager.

The medical center tried Hewlett-Packard's OpenView, Cabletron's Spectrum and others. FrontLine Manager gave the network managers the information they needed quickly, Zeien says.

Manage.Com is focusing on tools for "generalists, rather than specialists," says John McConnell, president of McConnell Associates in Boulder, Colo. Because the company's software has built-in intelligence, it can help network managers find problems faster.

E-PROBLEMS AHEAD

While simplified, Web-based network management was a good first step, Manage.Com is trying to tackle what it sees as the next big obstacle.

"The bigger issue is taking Web management to companies doing e-business," says Bob Quillan, vice president of marketing at the company.

Managing a company's internal network is something a lot of software packages can do, he points out. The next step is to manage not just a company's intranet, but also its extranet as well. When partner companies and customers are included, the management problem becomes more complex, and security and billing issues arise, Quillan says.

Now the company's challenge is to develop tools for managing electronic businesses quickly — as quickly as companies are adopting e-business techniques, he says.

Continued on page 78

THE EPSON DFX-8500

VS

THE NEW OKIDATA PACEMARK 4410
RELIABLE HIGH SPEED FORMS PRINTER

MTBF 10000 hours.*
The equivalent of only 4 years
and 9 months worth
of 40 hour weeks
of solid printing.

MTBF 15000 hours.*
The equivalent of 7 years
and 3 months worth
of 40 hour weeks
of solid printing.

If the name of the game is reliability, the name of the printer is Pacemark® 4410.

Basically, you can depend on the 4410 not to let you down.

We engineered it to stand up to virtually anything your toughest department can throw at it.

Its MTBF is 15,000 hours. The equivalent of 7 years and 3 months worth of 40 hour weeks of solid printing. (The Epson's MTBF is only 10,000 hours.) The Pacemark 4410 is rated for a workload of 35,000 pages per month, at 300 lines per minute. Seven years and 3 months times twelve months times 35,000 pages per month comes to 3,045,000 pages before failure. Our warranty is twice that of the Epson: 2 years on site for the printer, and 1 year on site for the printhead.

The 4-time Computer Reseller News Channel Champ brings you the only printer in its class that prints 10 part forms, not just 7. Which also means the latter pages in 7-part forms are a lot sharper than its competition's.

This is the perfect printer for all your toughest jobs, including monthly financial reports, and huge label runs. Our industry-leading technical and sales support includes self-paced training programs, free literature, joint sales calls, toll-free "7/24" service hotlines, and much more. Call 1-800-OKIDATA or visit our Website: www.okidata.com

OKI®
People to People Technology™

---

*Based on testing, actual results may vary. © 1999 Okidata, a Division of OKI America, Inc. OKI, Reg. T.M., M.D., M.R., People to People Technology and design. T.M., Oki Electric Industry Co., Ltd. PACEMARK, Reg. T.M., M.D., M.R., Oki America, In
Epson, Reg. T.M., Seiko Epson Corp. All specifications from respective company's product data sheets and web sites.

Free Product info enter NWInfoXpress #79 online @ **www.networkworld.com/infoxpress**

Continued from page 76

Network Alchemy whips up potent VPN brew

BY TIM GREENE

Network Alchemy is taking a new approach to virtual private networks (VPN): It is starting with the assumption that VPNs will become so big and so critical that customers will need high-capacity gear that just won't fail.

There are other big VPN boxes to be sure. For instance, some vendors have boxes that handle up to 5,000 VPN connections at a time. But if one of those stand-alone boxes fails, it brings down the whole VPN.

NETWORK ALCHEMY

Headquarters: Santa Cruz, Calif.

Contact information: (831)460-3800; www.networkalchemy.com

Products: VPN Servers; CryptoStation client software; CryptoConsole Java-based management tool

Top executive: David Kashtan, chairman and chief technology officer

1998 revenue: None (start-up)

Fun fact: The company has a position called minister of cryptography.

Network Alchemy sidesteps that problem with servers that load-share so, if one fails, others pick up the slack.

And Network Alchemy thinks big. Its first box, the VPN Server 5000, handles 20,000 simultaneous VPN connections. Up to 255 Server 5000s can be wired together to create a VPN that can handle a whopping five million users. Theoretically, 60 Network Alchemy boxes could handle the whole country.

For those who want to save money, Network Alchemy is planning to release a smaller server later this year.

SECURITY SUPPORT

Network Alchemy has crammed its servers with processing power to support its considerable list of security measures. The features include public- and private-key authentication, Data Encryption Standard encryption and tunneling protocols.

The company has 35 employees and is backed by $3 million in private funding plus $4 million from Trinity Venture Partners.

Network Alchemy gear is based on a proprietary operating system written by David Kashtan, the company's founder and chief technology officer. The operating system, known whimsically as DaveOS, was designed just to support network security, so the code contains no unnecessary overhead.

That is a virtue, says Mike Zboray, an analyst with Gartner Group, in Stamford, Conn. Network operating systems such as Unix or Windows NT can accommodate security features, but they are not strong enough.

"The best bet is something designed only to do remote access. It says, 'I take packets in and the only place they go is to a private network. I encrypt and decrypt. That's it,'" Zboray says.

From its claims and demonstrations, Network Alchemy looks promising.

Now we need to see if it will ultimately deliver.

Nextlink puts money down on LMDS

BY DENISE PAPPALARDO

Craig McCaw's Nextlink Communications was not exactly revolutionary when it started out five years ago. Instead, the firm took a nice safe road as a competitive local exchange carrier (CLEC) to small metropolitan areas such as Spokane, Wash., and Lancaster, Pa.

But it has thrown safety out the window. Now the company is thinking big and taking risks, such as investing $833 million in the still unproven Local Multipoint Distribution Services (LMDS) wireless spectrum.

Earlier this year, Nextlink spent $542 million to buy WNP Communications, which held 40 LMDS licenses. (It also paid the Federal Communications Commission $153 million in related license fees.)

In addition, Nextlink dished out $138 million to get partial ownership of 42 LMDS licenses from another McCaw business, Nextband Communications.

All these licenses could help Nextlink quickly offer local services in new markets because LMDS eliminates the need for the company to buy or build its own network, or strike deals with the sometimes uncooperative incumbent LECs. The downside of LMDS is that it is relatively new, and carrier-class equipment is still being developed. Unruffled, Nextlink plans to have LMDS equipment trials underway by year-end.

FIBER BACKUP

If LMDS fails, Nextlink still has 16,000 route fiber miles.

In addition, Nextlink is part of a joint venture company, Internext Communications, building a $700 million fiber-optic network that should be working by next year. The Internext network will connect Nextlink's 22 facilities-based local networks and support Nextlink's frame relay and ATM services due later this year.

NEXTLINK COMMUNICATIONS

Headquarters: Bellevue, Wash.

Contact information: (800) 900-6398; www.nextlink.com

Products: Local, long-distance and Internet services

Executive team: Craig McCaw, founder; Steven Hooper, chairman of the board; Wayne Perry, vice chairman and CEO; George Tronsrue, president and chief operations officer

1998 revenue: $140 million

Fun fact: Of Nextlink's nine board members, six held executive roles at former and current McCaw businesses.

In Nextlink, analysts see a company clearly on the move. The company, in fact, makes its debut on the Network World 200. It ranks 128.

"In the last six to 12 months, Nextlink has made fundamental changes in its business plan," says Michael Smith, managing director at Stratecast Partners, a Mountain View, Calif., consulting firm. "Nextlink is good at offering business users local dial-tone services, but it is now trying to evolve into a much broader company with a grander vision."

A tip of the Hat to Linux

BY ROBIN SCHREIER HOHMAN

A year ago, only a few people had heard of Linux. Now the operating system has a huge fan base, its own cutesy logo and even a Web-based mall that sells T-shirts.

Red Hat Software was an early Linux believer and is now reaping the benefits of its faith. The company dominated the Linux market last year, with 53.8% of the 2.6 million software units shipped, says Dan Kusnetsky, an analyst at market research firm International Data Corp., in Framingham, Mass. That market share translates into about $20.4 million in revenue for Red Hat. The company won't release numbers, but analysts figure Red Hat racked up about $25 million last year, with an extra $4 million to $5 million coming from Linux services.

RED HAT SOFTWARE

Headquarters: Durham, N.C.

Contact information: (919) 547-0012; www.redhat.com

Products: Red Hat Linux 5.2, plus Linux support

Top executive: Bob Young, CEO and co-founder

1998 revenue: Undisclosed

Fun fact: When Marc Ewing, co-founder and chief technology officer, lost his grandfather's red Cornell lacrosse cap while a student at Carnegie Mellon, he searched everywhere for it. The manual of the beta release of what was to become Red Hat Linux contained a plea asking readers to send him the cap if they found it while in Pittsburgh.

This year should be even better. Bob Young, Red Hat CEO and co-founder, predicts a 100% growth rate in the Linux market this year.

There's no way to tell how many people are using Linux, however. One version or another of Linux has been available for free on the Internet for years. You can legally buy one copy of any Linux software and put it on an unlimited number of computers.

For Red Hat, that means long-run money is to be made on services.

"We look at selling software as a commodity play — we don't think of ourselves as a software company," Young says. He won't say how much of that commodity Red Hat is selling — he does not have to, the company is private. But Young says, with a laugh: "We're doing so well it makes me nervous."

The company is doing well enough to hire more than 100 employees, and Red Hat itself has become a hot buy. Last September, industry giants Intel and Netscape bought a minority stake in the 4-year-old company.

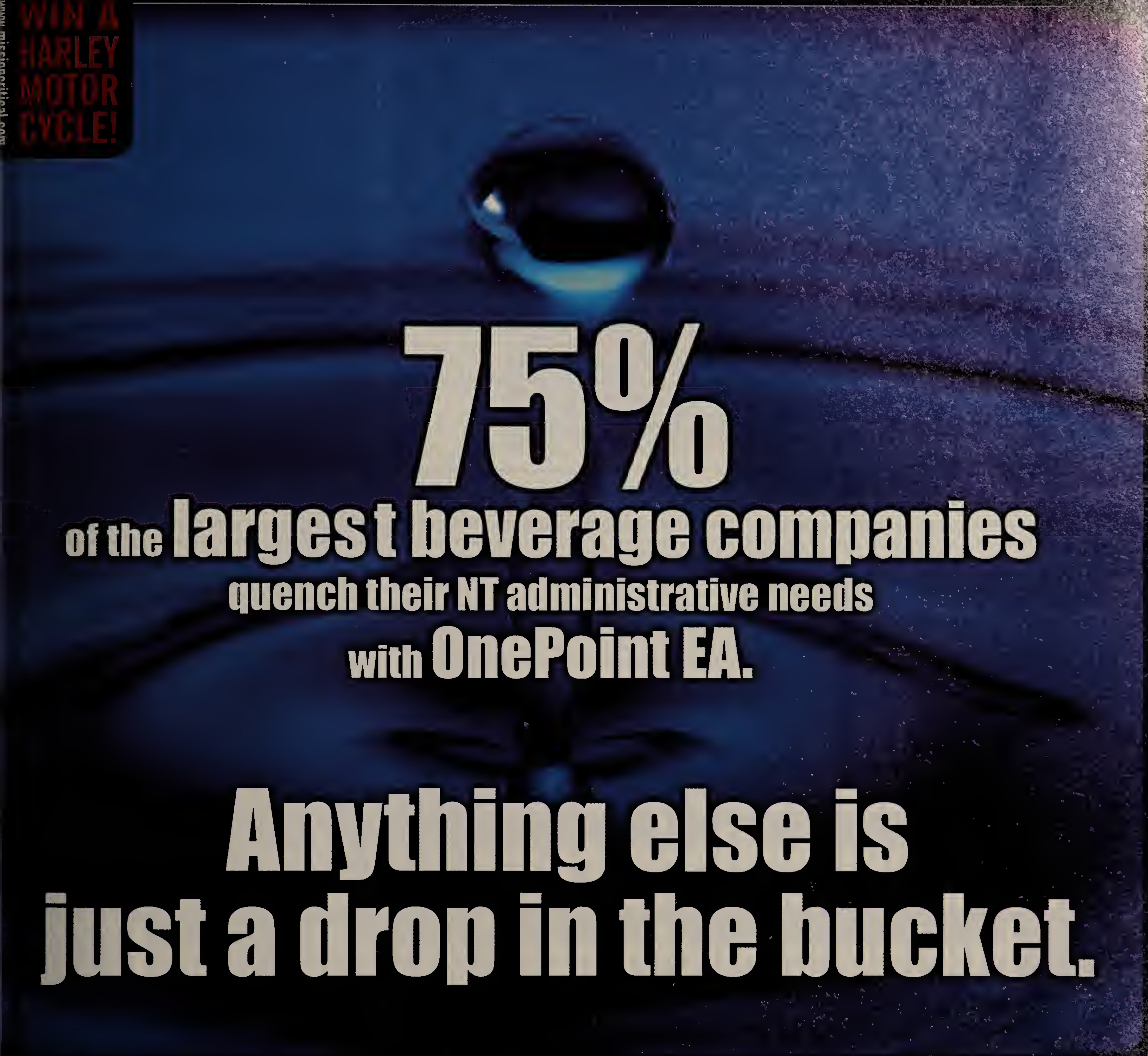
Early this year, Compaq, IBM, Novell and Oracle also bought in, and IBM has signed an agreement to resell Red Hat Linux with some of its Intel-based hardware. Red Hat also has deals with Dell, Hewlett-Packard, Informix and Corel.

AN ENTERPRISE FUTURE?

Red Hat is clearly a big name among Linux cultists. To boost name recognition within the enterprise, Red Hat last year formed the Enterprise Computing Division.

This market may be tougher to crack, as IT

Continued on page 80



www.missioncritical.com
WIN A HARLEY MOTOR CYCLE!
75% of the largest beverage companies quench their NT administrative needs with OnePoint EA.
Anything else is just a drop in the bucket.

NT & WIN 2K: ADMINISTRATION SECURITY MIGRATION OPERATIONS

OnePoint EA - THE systems management suite for enterprise scale Windows NT and Windows 2000 networks.

OnePoint EA provides a single, modular solution for actively administering all aspects of Windows NT and Windows 2000: user accounts, directory content, domains, events, exchange mailboxes and Windows 2000 migration.

Over 500 of the world's largest organizations use OnePoint EA to reduce the TCO of their NT environments. Contact Mission Critical Software at www.missioncritical.com or 713-548-1700 to find out what we can do for you.

mcs
mission critical softwa

For partner information call 1-888-323-6768 or visit www.missioncritical.com/partners.

Continued from page 78

executives shy away from this still nonstandard operating system. But just as fans snuck PCs and Macs into IS shops in the early days, Linux advocates are bringing in the operating system and not asking for permission.

"Quite often, the IT executives aren't aware Linux is there," Kusnetsky says. That may well be true: IDC estimates that 17% of all new servers shipped last year ran Linux.

Ukiah sets policy

BY JULIE BORT

Incomparable. That's the kind of praise Ukiah Software is receiving for its policy-based management software, which supports multiple vendors' devices.

"Ukiah is incomparable because it is a company that, right now, has no competition in this space," says Sam Alunni, president of Sterling Research, a network management analysis firm in Sterling, Mass.

While Ukiah isn't the only vendor delivering policy-based management tools, it stands alone as an independent software maker. Most quality-of-service (QoS) products are proprietary and are developed by a hardware vendor for its product.

Conversely, Ukiah's NetRoad Active Policy System lets network managers define QoS policies for a variety of devices from a central console. NetRoad can control routers, switches, remote access servers and application servers from companies such as 3Com, Cabletron, Cisco and Extreme Networks. And, of course, it supports Ukiah's NetRoad TrafficWare traffic management product.

NetRoad Active Policy System achieves its platform independence by supporting standards such as Common Open Policy Service, SNMP and command-line interface. NetRoad also supports control mechanisms based on IP precedence as well as Differentiated Services, Resource Reservation Protocol, committed access rate, rate shaping and others.

SUPPORT SOLVES PROBLEMS

Multivendor support makes Ukiah a true problem solver, says Brian Sandberg, senior engineer for General Dynamics Information Systems, in Lexington, Mass. NetRoad frees Sandberg from being locked into a single vendor, while allowing him to "prioritize mission-critical applications and establish effective traffic management for various application types," he says. Plus, Ukiah's tools support some legacy Cisco routers.

Moreover, Ukiah ties its QoS framework into what has become the Holy Grail of network management: the directory. Directory services such as Novell Directory Services (NDS) already hold a slew of vital information on users. By tapping into those directories, network managers can set policies for individual users or groups, as well as applications, "without needing to create yet another directory," says Gordon Smith, vice president of marketing for Ukiah.

Ukiah supports NDS, as well as Microsoft's upcoming Active Directory and Lightweight Directory Access Protocol Version 3. The product also includes a stand-alone database for user information, should a user not have a directory.

But many a young start-up has created top-notch technology only to flounder and leave its customers aground. Ukiah rates on our 10 companies to watch list because it seems to have stable financials and a logical marketing plan. The company recently completed its third round of venture capital funding, and it has targeted two of the neediest market segments: worldwide ISPs and enterprises.▲

UKIAH

Headquarters: Campbell, Calif.

Contact information: (408) 369-2890; www.ukiahsoft.com

Products: NetRoad Active Policy System, NetRoad TrafficWare

Top executive: Naveen Bisht, president, CEO and founder

1998 revenue: Undisclosed

Fun fact: Ukiah is a Pomo Indian word that roughly translates to "beautiful valley," a testament to the Northern California city that bears the name. But the company's founder chose it for a far more banal reason. Bisht plucked it out of an AAA directory, which he turned to in desperation after his lawyer informed him that all his previous name choices had already been claimed.

MORE ONLINE: Let us know what network company you think is worth watching. Go online to our NW200 minisite, DocFinder: 2703.

www.nwfusion.com/nw200

What do you call the one communications company that gives business customers exactly what they've been asking for?

We think the answer to the question is **e.spire**. We're **e.spire** Communications, Inc. (ESPI on NASDAQ), and we're reshaping the way businesses get telecommunications services.

We are an integrated communications provider. Industry talk for a phone company where "one call does it all." We make available the latest in local phone services, long distance, Internet access and high volume data transmission — all from one source.

And we do it all with razor sharp pricing and a level of service so thorough, you'll soon realize just how much attention you weren't getting.

If your business is on Wall Street, you'll be hearing about us. If it's on any other street, you'll be hearing from us.

e•spire™

Ranked 1st in 1997 and 8th in 1998 on "The Network World 200" list of fastest growing network players.

NASDAQ Symbol ESPI.

www.espire.net

Free Product info enter NWInfoXpress #71 online @ **www.networkworld.com/infoxpress**

Lost the dongle.

RealPort™

The Integrated PC Card

Nothing to Break. Nothing to Lose.

It usually happens when people need their PC cards the most. But it'll never happen with the family of RealPort Integrated PC Cards. There's nothing to break. Nothing to lose.

After years of connecting with LAN and modem cables, we came up with a better way. We got rid of them.

Dongles are history. Connect with the times.

With RealPort Integrated PC Cards, you will reduce your support calls, user downtime and eliminate cable replacement costs. Revolutionary RealPort Integrated PC Cards provide your notebook users with:

- Robust cable-free connectivity
- High-performance 10/100Mbps Ethernet and 56K modem speeds supporting V.90 and K56flex standards
- 16-bit and 32-bit LAN+modem, LAN-only and modem-only cards
- GSM, AMPS cellular and ISDN capabilities

Visit our Web site or call for information regarding Xircom's:

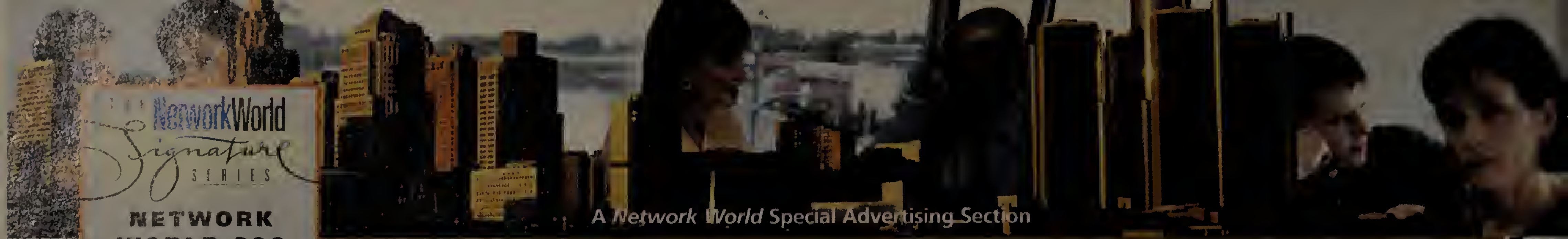
➤ Trade-In Promotion
➤ Evaluation Unit Program

www.xircom.com
or call toll free:
877-RealPort (877-732-5767)

Xircom

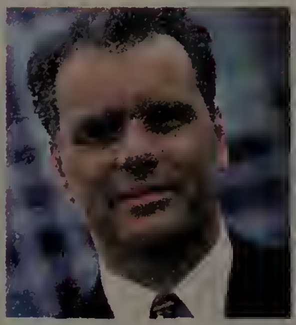
Get mobile. Stay connected. Go places

©1999 Xircom, Inc. Xircom is a registered trademark of Xircom, Inc. Xircom U.S. Headquarters: (805) 376-9300 Xircom in Canada: (905) 479-0230 Xircom in Latin America (727) 343-7040



Executive Profiles

CONTINUED



Tom Gill, President and CEO
FORE Systems
(888) 404-0444
www.fore.com

FORE is leveraging the growth of the Internet to carriers requiring multiservice capabilities for customers of the "New Public Network". FORE's solutions provide the scalability, reliability and capacity for large "Next Generation" enterprise networks that are enabling business advantages and competitive strategies based on the availability of the New Public Network.

A.J. Berkeley, President and CEO
Interlink Computer Sciences
(800) 366-5452
www.interlink.com

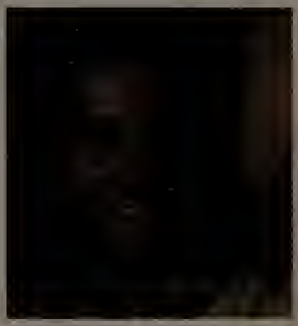
Interlink Computer Sciences, Inc. is a worldwide, independent supplier of software solutions that enable its customers to provide secure, managed access to their TCP/IP data center over public and private connections. The company's e-Access product family addresses the areas of access, management and control, and network transport via TCP/IP for IBM and IBM compatible OS/390-based mainframe computers.

John Drew, President and CEO
International Network Services
(650) 318-1000
www.ins.com

With more than 1,200 highly trained engineers worldwide, International Network Services offers the industry's largest, most experienced team of network consultants, all uniquely qualified to support the networking needs of the Global 2000. Backed by the VitaSuite family of network and application performance management solutions, INS is well positioned to help businesses worldwide design, build and maintain the application-ready enterprise of the future.

Thomas E. Noonan
President and Chief Executive Officer
ISS
(678) 443-6000
www.iss.net

ISS is the pioneer and leading provider of adaptive security technology delivering enterprise-wide information risk management solutions. ISS's award-winning family of SAFEsuite products manages security risks and enhances end user confidence in Intranet, extranet and electronic commerce environments. SAFEsuite enables automated monitoring, detection and response to security vulnerabilities and threats, enabling ongoing information protection.

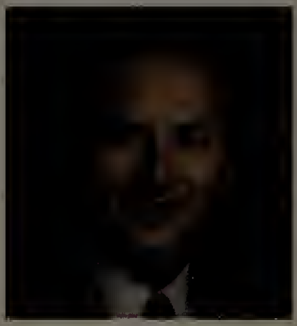


Fred Thiel, President and CEO
Lantronix
(949) 453-3900
www.lantronix.com

Lantronix focuses on the burgeoning market for thin servers and embedded technology for automation, communications, security and data collection applications. Our products connect non-computer serial devices to any network, enabling human-to-machine and machine-to-machine communications over a LAN, WAN, or the Internet. The company's vision encompasses industries as diverse as scientific instrumentation, medical, industrial automation, farming, construction/building maintenance and security, among others. Visit the Lantronix home page at www.lantronix.com for more information.

Mike Bennett, CEO
Mission Critical Software
(888) 323-6768
www.missioncritical.com

Mission Critical Software has emerged as a leader in Windows NT systems management by developing a comprehensive solution, called OnePoint EA, for actively administering all aspects of Windows NT and Windows 2000 including user accounts, directory content, domains, events, exchange mailboxes and Windows 2000 migration. Our OnePoint EA suite secures, unifies, and simplifies Windows NT and Windows 2000.



Joseph P. Nacchio
Chairman and Chief Executive Officer
Qwest Communications International Inc.
(800) 899-7780
www.qwest.com

Qwest Communications International Inc. is a leader in reliable and secure broadband Internet-based data, voice and image communications for businesses and consumers. The Qwest Macro Capacity* Fiber Network, designed with the newest optical networking, will enable customers to seamlessly exchange multimedia content — images, data, and voice — as easily as traditional telephone networks enabled voice communication. Qwest is the leader in a new communications paradigm based on bandwidth and the exchange of digital information.

All efforts have been made to make this listing as complete and accurate as possible. *Network World* is not liable for errors or omissions.

Executive Profiles

CONTINUED

Walter W. Straub, *President and CEO*

Rainbow Technologies

(949) 450-7300

www.rainbow.com

At Rainbow Technologies we are taking a leading role in building the Internet Commerce infrastructure. From authentication and performance products for Virtual Private Networks (VPNs) and extranets to electronic software distribution, our innovative products are making business-to-business Internet solutions a reality.

Dave Crocker, *CEO*

Ripple Technologies

(215) 321-9600

www.rippletech.com

Ripple Technologies is providing technology that defines simplicity in performance awareness of hardware and software resources in networked environments. Ripple is integrating this technology with tools that allow users the ability to maximize the use of network resources and amplify the security of the corporate digital environment. Simple, reliable, efficient products that provide honest representations of network integrity and performance.

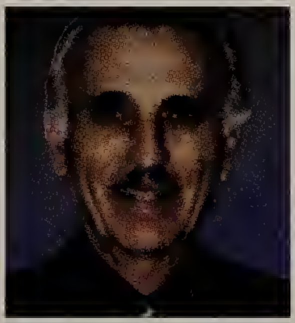
Peter Macourek, *General Partner*

Rose Electronics

(281) 933-7673

www.rosel.com

Rose Electronics developed the first automatic parallel printing switches, plug-in laser printer servers, pocket printer servers, and keyboard-controlled KVM switches. Rose is a full service manufacturer of peripheral sharing, keyboard, video, mouse, and LAN print server products. Products carry a full one-year warranty and unlimited technical support. For more information contact Rose Electronics (281) 933-7673 or visit www.rosel.com.



Bryant Dunetz

CEO

Telco Exchange, LLC

(877) 988-6484

www.telcoexchange.com

Telco Exchange is an e-commerce site (www.telcoexchange.com) that provides enteprise customers in the $50 billion data network services market with a single web-based interface for pricing and ordering high bandwidth digital circuits with carriers across the U.S. and Canada. Our nationwide VAR partner program facilitates local installation of the Internet and WAN applications by certified network engineers.

Gerry Gagliardi

President, Unisys Global Customer Services

Unisys Corporation

(800) 874-8647

www.unisys.com

Unisys Corporation is a $7.2-billion provider of information technology solutions. Unisys solutions are based on a broad portfolio of global information services including systems integration, outsourcing, "repeatable" vertical-industry application solutions, consulting, network integration, remote network management, and multivendor maintenance and support, coupled with enterprise-class servers and associated middleware, software and storage.

Luc Beaubien

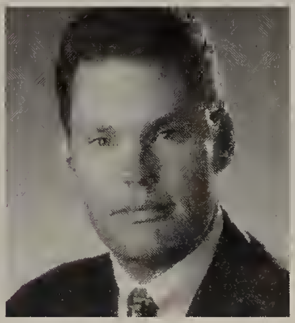
President and CEO

VIPswitch

(450) 923-4040

www.vipswitch.com

VIPswitch Inc. is focused on providing enterprise customers with the best price performance and end-to-end QoS @ wire-speed solution, for the integration of IP video, voice and data communications across their LANs and WANs - while enabling 100% of their bandwidth. At the same time, it is our goal to provide multi-service access providers with the most effective means to offer video, voice & data communication services to enterprise customers. VIPswitch addresses these challenges by supplying the method of convergence over a single or multiple WAN while supporting end-to-end QoS, trunking, load balancing & line redundancy.



Dirk Gates

Chairman, President and CEO

Xircom, Inc.

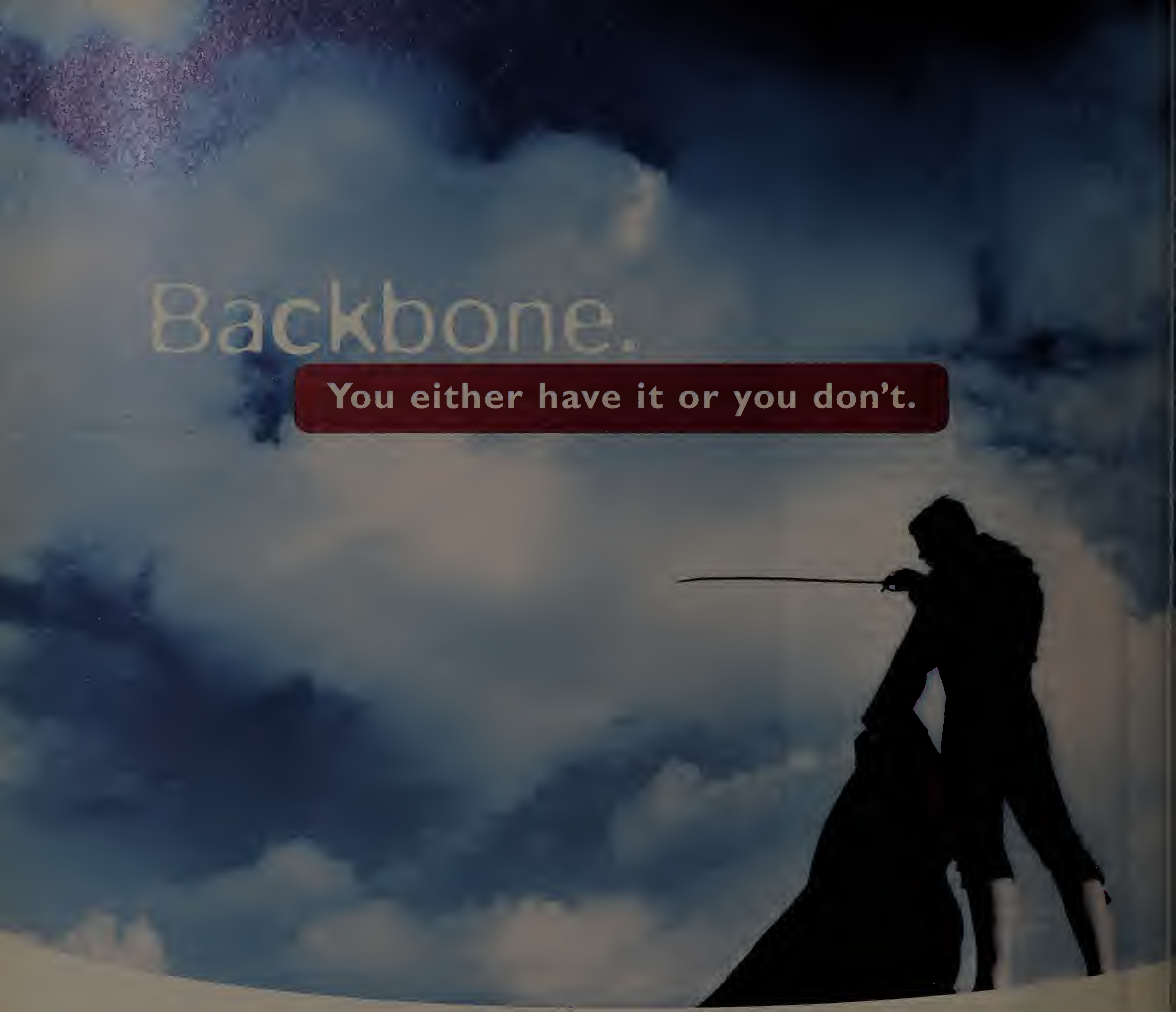
(805) 376-9300

www.xircom.com

Xircom, Inc.: Celebrating 10 Years of Innovation, Leadership and Focus in Mobile Communications

Xircom, Inc. created the mobile networking market in 1988 with the introduction of the Pocket LAN Adapater. Ten years later, with the same vision for connecting mobile PCs to networks, the company provides mobile users with a diverse set of award-winning communications solutions including Integrated PC Card, PC Card and CardBus products. Xircom solutions enable mobile users around the world to connect to corporate networks, the Internet and other online resources from a wide variety of locations conveniently and reliably.

All efforts have been made to make this listing as complete and accurate as possible. *Network World* is not liable for errors or omissions.


Backbone.
You either have it or you don't.

CABLE & WIRELESS
USA

Cable & Wireless USA has it. We have one of the most powerful, most reliable Internet backbones on the planet. A rock-solid, high-speed backbone built specifically to carry mission-critical data and applications. Letting you move terabytes of information—or take tens of millions of hits—in total confidence. See for yourself at **traffic.cwusa.com**.

For information call **1.800.969.9998** or you can visit us at **www.cwusa.com**.

Free Product info enter NWInfoXpress #68 online @ **www.networkworld.com/Infoxpress**

Where are they now?

The race for glory is over for most of 1998's start-ups, but a few are still in the running.

BY *NETWORK WORLD* STAFF

If you compare growing a start-up to running a race, then the newcomers we picked as 1998's "10 Companies to Watch" represent just about every type of contender. None of the start-ups is running a victory lap around a successful initial public stock offering. But, in a sense, seven of the companies have crossed the finish line — they've been acquired. Of the remainder, only one is running strong on its own, while two are still warming up.

STILL WARMING UP

NextPoint Networks

If nothing else, NextPoint Networks was in the right place at the right time. Its message of "business-oriented" network management was just what users wanted to hear. One year later, just about every network management vendor is trying to tie application and network management to business objectives, including more established players such as Concord Communications and International Network Systems. "Others have followed our lead, and that's great because it means we're on the right track," says William Maro, president and CEO of NextPoint in Westford, Mass.

In 1998, NextPoint attracted 100 customers and doubled employee count to 60. It also beefed up its management team, received $12 million in funding and released Version 1.2 of its S3 performance and service-level management software.

In the year ahead, NextPoint will expand its application monitoring capabilities and try to ensure it doesn't get run over by all the other companies that are rushing down the track it helped pave.

— Jeff Caruso

Sitara Networks

Sitara Networks says its SpeedServer product gives end users an express path through Internet congestion: Think Roto-Rooter for the Web. The software works by streamlining the connection between your Web site and a client.

But Sitara found it difficult to penetrate the enterprise because of SpeedServer's initial $75,000 entry price and the fact that the product uses a tweaked, proprietary version of TCP/IP. The Waltham, Mass., company was forced to lower SpeedServer's starting price to $14,995 and change its target market. Now Sitara is more narrowly focused on financial services firms, and so far, it has racked up Putnam Investments and a major investment bank, which the company won't name, as customers.

Last spring, Sitara garnered $5 million in its third round of financing, bringing its total to $17.5 million. In March, Intel bought an equity stake in Sitara and took a seat on its board of directors.

— Robin Schreier Hohman

LEADING THE PACK

ArrowPoint Communications

This should be another good year for ArrowPoint Communications.

In February, the company shipped its second product: the CS-800, a chassis-based server load balancer that's part of its Content Smart Switch line. Industry analysts expect the server load-balancing market to surge, and ArrowPoint is positioned to become a key player. The company has the right idea: Enable the network to make intelligent decisions about routing TCP/IP traffic.

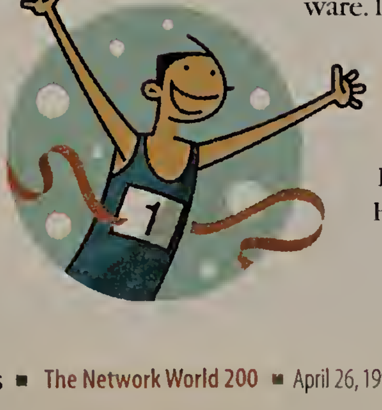
Last year, ArrowPoint went through a third round of funding, bringing the total to $33 million. President and CEO Cheng Wu expects to see $20 million to $30 million in revenue for fiscal 1999, the company's first full year shipping the product. Cheng also hopes to bring the Westford, Mass., company public in early 2000.

— Robin Schreier Hohman

CROSSED THE FINISH LINE

AbirNet

Founded three years ago, AbirNet created a buzz with its SessionWall-3 network monitoring tool, which reports on network statistics and scans traffic for suspicious hacker activity. SessionWall-3 became one of the earliest commercial products for intrusion detection.



Israel-based AbirNet last year logged $5 million in sales, but in May, it was scooped up for $27.5 million by Memco, another security vendor in Israel. In March, Platinum Technology bought Memco for roughly $200 million. That means SessionWall Enterprise, set to ship later this spring, will carry the Platinum brand name. The AbirNet name is history, says Marty Leamy, Platinum's senior vice president of systems management. And now the name is buried even deeper. At the end of last month, Computer Associates announced plans to acquire Platinum.

— Ellen Messmer

Aptex Software

Who says you can't go home again?

Three years after leaving the nest of HNC Software, which had an 80% stake, Aptex Software of San Diego finds itself back under the old parental wing. HNC re-acquired Aptex earlier this year after the fledgling software maker registered its ninth consecutive profitable quarter on the strength of its SelectResponse and SelectCast products, which help companies manage e-mail, Web forms and phone calls.

Managing partnerships headed the company's 1998 agenda. Aptex inked agreements fusing its neural network and content analysis techniques with complementary technologies from companies such as Acuity, Aspect, eGain, Genesys/Adante and Mustang. The company also landed big contracts with E*Trade, Ameritrade, Netscape and Geocities.

Aptex will continue to operate as an independent business unit, and HNC intends to fold Aptex technology into its own offerings.

— Paul McNamara

Bright Tiger

One of Bright Tiger's shining moments in 1998 was when Allaire decided to integrate the start-up's clustering technology into its popular Cold Fusion Web site development tool.

Little did it know that deal marked the beginning of something much bigger. Earlier this month, Allaire announced that it was acquiring Bright Tiger for 300,000 shares of common stock, or approximately $17 million. In addition, it's assuming $3 million of Bright Tiger's debt.

Bright Tiger, of Acton, Mass., has done well with its ClusterCATS Web resource manager software. In addition to forging the Allaire agreement, last year the company closed sales and marketing deals with some of the most aggressive players in server load balancing. Partners include Alteon, ArrowPoint, F5 Labs and RadWare/RND Networks. This Tiger is roaring now.

— Robin Schreier Hohman

ILLUSTRATIONS BY LEO ESPINOSA

NetSpeed

NetSpeed burst out of the digital subscriber line (DSL) starting gate in 1997 with a full menu of hardware to support dedicated broadband services over regular phone lines. The new company had a complete package: customer modems, service provider access multiplexers and corporate-site routers to terminate multiple DSL sessions.

NetSpeed even had a few innovations, such as a "digital off-hook" feature that lets carriers drop a DSL connection when no traffic is traveling over it, allowing carriers to get by with fewer DSL modems in switching offices. Cisco was so impressed that it snapped up NetSpeed in March 1998 for $265 million.

Since then, Cisco has incorporated NetSpeed products in its own line, renaming NetSpeed gear with its own snappy product numbers — the Cisco 605, Cisco 675 and Cisco 6100. Using NetSpeed technology, Cisco is developing customer premises and carrier gear gear to support higher densities of DSL lines.

— Tim Greene

Switched Network Technologies

When we profiled Switched Network Technologies, SNT President and CEO Lance Smith said 1998 would be a make-or-break year. The company's only products were for LAN-based ATM, centered around ATM to the desktop, a difficult market in this era of high-powered Ethernet.

SNT broke. It broke into little pieces that have been swept under the carpet. Telecommunications vendor Tellabs quietly bought SNT for an undisclosed amount in September 1998, then discontinued its product line and dissolved the company.

Tellabs says it wanted SNT's ATM expertise for WAN products. But now the former company isn't even mentioned on Tellabs' Web site.

Asked about what happened to SNT, a tight-lipped company spokesman would only say that SNT found Tellabs' offer attractive and wanted to be part of a company with greater resources.

— Jeff Caruso

Torrent Networking Technologies

In the course of last year, Torrent Networking Technologies shifted its focus from enterprise users to ISPs. The rationale: With the advent of virtual private networks and the trend toward outsourcing, enterprise users no longer faced as great a need as ISPs to replace their backbone Cisco 7500s.

Torrent's pitch got it business with 25 service providers and, more important, captured the attention of Swedish telecom giant Ericsson. The vendor earlier this month announced that it has acquired the Silver Springs, Md., start-up for $450 million in cash. Torrent employees will become part of Ericsson Datacom group.

Ericsson says it needs Torrent's carrier-class IP gigabit router, which can forward tens of millions of packets per second, to aggregate and deliver quality-of-service IP traffic. The router also rounds out Ericsson's Multi-protocol Label Switching solution for IP over ATM. The vendor says it can now deliver end-to-end IP and ATM networks.

Torrent posted 1998 revenue of $200,000.

— Jim Duffy

YAGO Systems

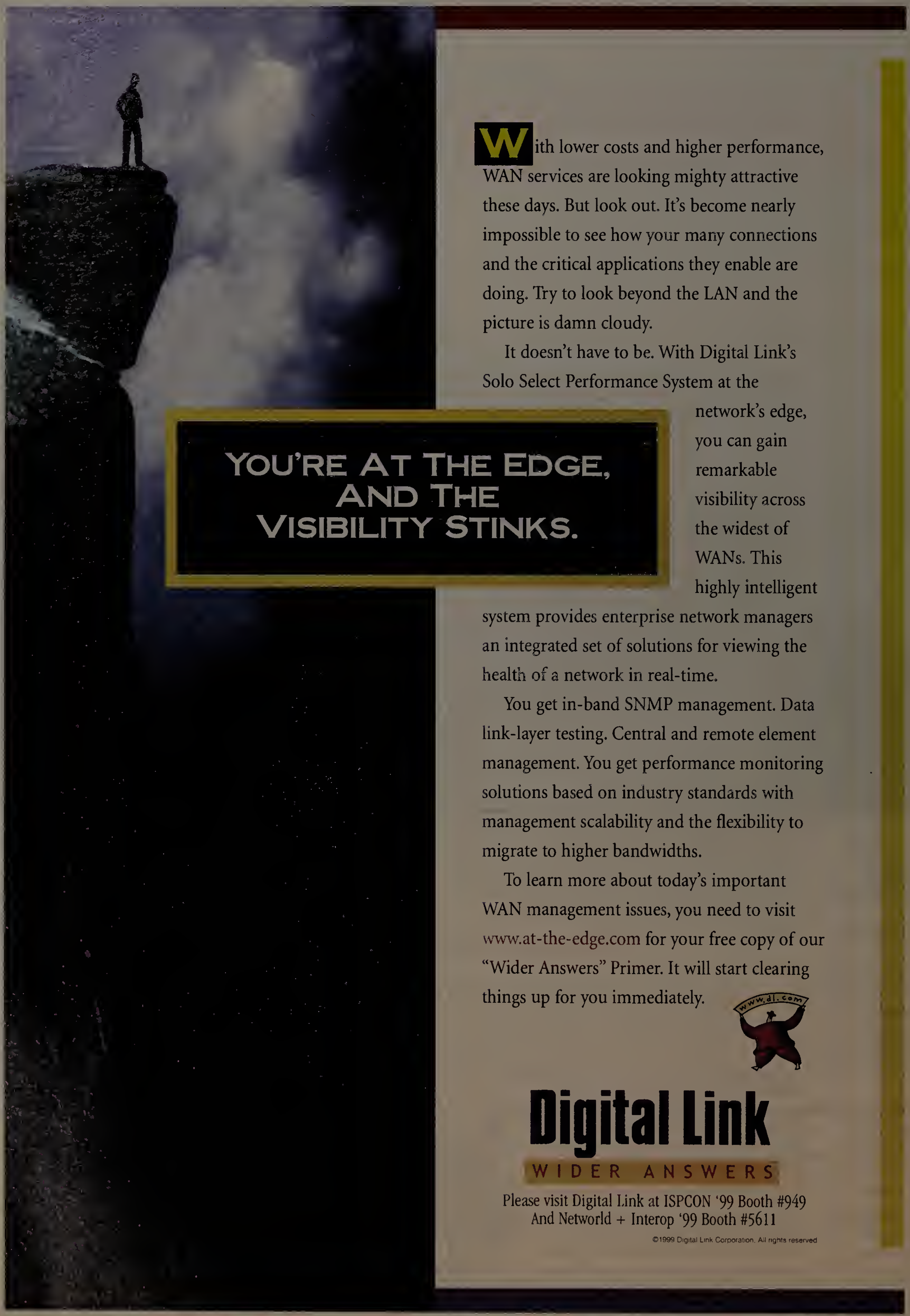
Apparently, we weren't the only ones keeping our eyes on YAGO Systems last year.

In March 1998, Cabletron gobbled up YAGO in a jaw-dropping $213 million stock exchange. That was quite a haul for a relative latecomer to the wire-speed router market whose technology was promising, but not yet shipping.

That's changed, too. YAGO's Layer 4 switching technology is now Cabletron's SmartSwitch router.

The acquisition was a natural progression for the Sunnyvale, Calif., start-up — Cabletron already had a 25% stake. Hence, YAGO was swallowed whole and intact: All three founders and virtually the entire original staff of 43 employees remain with Cabletron.

— Julie Bort



YOU'RE AT THE EDGE, AND THE VISIBILITY STINKS.

With lower costs and higher performance, WAN services are looking mighty attractive these days. But look out. It's become nearly impossible to see how your many connections and the critical applications they enable are doing. Try to look beyond the LAN and the picture is damn cloudy.

It doesn't have to be. With Digital Link's Solo Select Performance System at the network's edge, you can gain remarkable visibility across the widest of WANs. This highly intelligent system provides enterprise network managers an integrated set of solutions for viewing the health of a network in real-time.

You get in-band SNMP management. Data link-layer testing. Central and remote element management. You get performance monitoring solutions based on industry standards with management scalability and the flexibility to migrate to higher bandwidths.

To learn more about today's important WAN management issues, you need to visit www.at-the-edge.com for your free copy of our "Wider Answers" Primer. It will start clearing things up for you immediately.

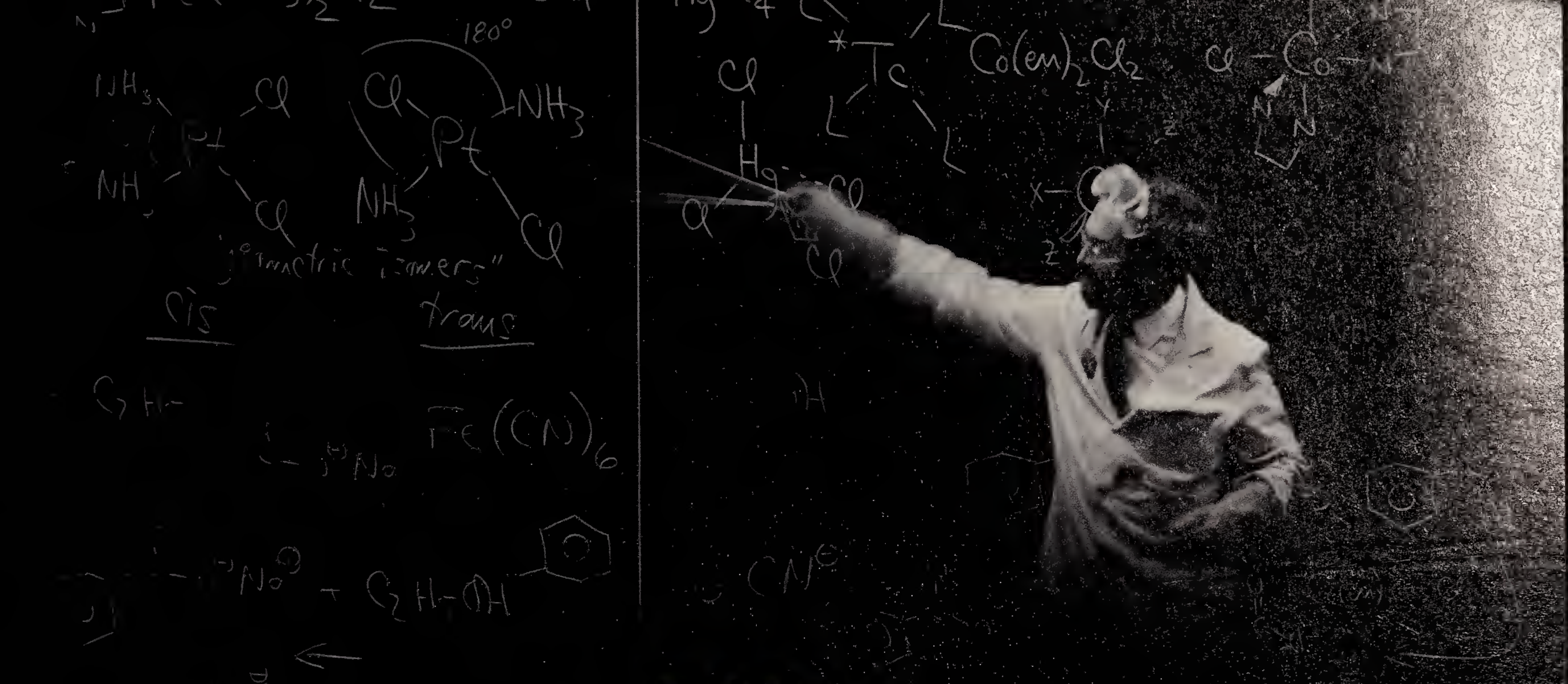
Digital Link

WIDER ANSWERS

Please visit Digital Link at ISPCON '99 Booth #949
And Networld + Interop '99 Booth #5611

©1999 Digital Link Corporation. All rights reserved

Free Product info enter NWInfoXpress #70 online @ www.networkworld.com/infoxpress



E-COMMERCE SECURITY DOESN'T HAVE TO BE SO E-COMPLICATED.

When you've got the right security solution, taking the leap into e-commerce isn't so intimidating. SAFEsuite from ISS prioritizes security risks on the fly, paving the way for e-commerce profits. Our enterprise-wide approach to security policy compliance, vulnerability management, and intrusion detection makes it simple. SAFEsuite constantly monitors, detects, and responds to risks. It applies the knowledge base of the industry's leading security experts. And it gives suppliers and customers the wide access they demand. Find e-commerce security answers with SAFEsuite. Visit www.iss.net/safesuite or call 1 800.776.2362.

ISS
INTERNET SECURITY SYSTEMS

www.iss.net/safesuite

Free Product info enter NWInfoXpress #73 online @ **www.networkworld.com/infoxpress**

The board game

Who are the people directing some of the hottest network companies?

BY JULIE BORT

Business is a game of strategy. How should a company position itself? What will its opponents do? What countermoves are available? With proper planning, a company can control the board. Make a wrong move, and the game may be over.

As *Network World* examines the top 200 network companies, we behold the knights of the boardroom, the talented individuals who mold corporate strategy into a weighted die, rolling winning numbers on command.

Behind most top-rated companies is a top-notch board, one that can maneuver the company safely through critical decisions, such as when to sell the company and to whom, says Todd Dagres, general partner of Battery Ventures in Wellesley, Mass.

Dagres, a board member of six IT companies, recalls the sale last April of local exchange carrier XCom Technologies to Level 3 Communications. He was on XCom's board, and things were going well when Level 3 offered to buy.

"Once you entertain selling the company you run the risk of the sale not happening and the company becoming tainted," he says.

Still, his experience from directing other companies told him the time was right. The board opted to sell and, in hindsight, made the right choice. The Level 3 stock Dagres received has appreciated 120% since the deal closed, he says.

That kind of decision-making know-how in the boardroom is literally golden. But among the hundreds of members who serve on the boards of Network World 200 companies, only a few have honed their business skills through multiple directorships. Especially rare are those who have done so at top corporations.

VENTURING A BOARD

In the high-tech industry, outside directors — board members who don't work for the company — come from two groups: venture capitalists and successful CEOs, current and former.

The image of venture capitalist as start-up superhero isn't far from the truth; in fact, a venture capitalist's influence goes even further. Because many venture capitalists stick with companies for the long haul, perhaps no other group is so predominant on public technology company boards.

"We almost always take board seats when we make investments, and we stay with the company as it moves along," says Jeff McCarthy, general partner of North Bridge Venture Partners in Waltham, Mass., and former CEO of New Oak Communications, a start-up acquired early last year by Bay Networks, which itself was bought later in the year by Nortel Networks.

All but the oldest, most-established NW200 companies have at least one venture capitalist director. And some, such as Microsoft, have several.

When it comes to the rest of the board, venture capitalists are to start-ups what the president is to a vacant Supreme Court: They help the company staff its board, influencing the company's success for years to come.

"Generally speaking, we get people for board positions who come out of the IT industry or people who are technically savvy from other industries — for example, a chief information officer of a finance company," says Dagres, who sits on the boards of Akamai Technologies (see "10 Companies to Watch," page 71), Convergent Networks, InformationView Solutions, Inventa, Qtera Technologies and Redstone Communications.

While any good venture capitalist may wield significant influence in IT, a few stand as elite board material. They include John Doerr, partner of Kleiner Perkins, and Dick Kramlich, partner of New Enterprise Associates. Doerr sits on the boards of Netscape, Amazon.com, @Home, Sun and others. Kramlich directs Ascend, Macromedia, Silicon Graphics and others.

Certainly Arthur Rock, principal of Arthur Rock & Co., also deserves mention. Some call

THE HOTTEST BOARD MEMBERS

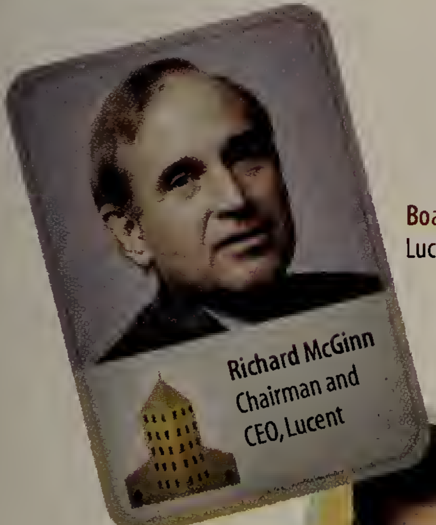
Select people sit on multiple boards of the largest, most successful public technology companies. The board recruitment firm Spencer Stuart deems those listed here, representing venture capitalists and corporate executives, as among the most influential by virtue of the companies they direct.

Venture capitalists who play a significant role in the formation and growth of the new generation of companies:

Boards: Amazon.com, @Home, Intuit, Macromedia, Netscape, Platinum Software, Shiva, Sun, Tera Computer

Boards: Ascend, Chalone Wine Group, Graphix Zone, Lumisys, Macromedia, Neopath, Object Design, Silicon Graphics, Syquest Technology

Distinguished executives who serve on only two or three prestigious boards:



Boards: American Express, Lucent, Oracle

Judith Estrin
Senior vice president and CTO, Cisco

Boards: Federal Express, Rockwell International, Sun, Walt Disney

George Fisher
Chairman and CEO, Eastman Kodak

Boards: AT&T, Eastman Kodak, General Motors

SOURCE: SPENCER STUART, SAN FRANCISCO

him the father of venture capitalism. Now 71, Rock has been a director of Intel since it was founded in 1968, and he helped seed Apple. He's a trustee of the California Institute of Technology and still sits on a handful of boards, including those of AirTouch Communications and Echelon.

An offshoot of venture capitalists are angel investors — people who plow their own money into private companies. Like the venture capitalists, angels usually assume a board seat and often hold a half-dozen board positions at a time. One well-known angel in the IT community is Jim Dow, founder and former CEO of MicroCom (since acquired by Compaq) in Norwood, Mass. Dow sits on the boards of Omnia Communications, Nexabit Networks, MapleTree Networks and Process Software — all companies in which he has invested.

Another premiere angel investor is Gary Bowen, a former executive of Bay Networks. Bowen has been in particular demand. He holds directorships at five private companies via investments: Epicon, Apogee Networks, Castle Networks (at least as of March, when it was acquired by Siemens), Quantum Bridge Communications and Kaon Interactive. He also sits on the boards of public companies Xircom and GeoTel Communications, just acquired by Cisco.

As an angel, Bowen has successfully guided four companies to the acquisition finish line: Cadia Networks, acquired by FORE in January; Arris Networks, snapped up by Cascade Communications in April 1996 (Cascade was acquired by Ascend the following year); Prominet, bought by Lucent in December 1998; and New Oak Communications, purchased by Bay Networks in January 1998.

An angel may choose to continue on the board through an initial public offering and beyond. For instance, Dow, who favors data network companies, typically guides his companies to the sale. "But in the case where they go public, my intention is to serve on the board as long as I am needed," he says.

> "It helps to turn to people who have been there and done it."
> Jim Dow, angel investor

BIGGER AND BETTER

When a company is born, having a board that knows how to raise operating capital is imperative. But as the company begins to generate revenue, it looks for different qualities in its board, often adding seats, says Rick Gostyla, director of the high-tech practice for Spencer Stuart, an executive recruiting firm that specializes in board-member placements worldwide.

"A company, before it goes public, tends to have investor professional board members. When a company goes public, it starts staffing the board with outside directors," Gostyla explains.

The quality most in demand from outside board members is real-world experience. "Whether it's something as simple as relocating or as complex as developing a strategy, it helps to turn to people who have been there and done it," Dow says.

Not surprisingly, the hottest network companies make prime raiding ground for folks with such hands-on experience. The crème de la crème include Richard McGinn, chairman and CEO of Lucent; George Fisher, chairman and CEO of Eastman Kodak; and perhaps the hottest property of all, Judith Estrin, senior vice president and chief technology officer (CTO) of Cisco.

Estrin has the coveted combination of management know-how and technology savvy. And having women directors has become a major goal for companies tracked in the Spencer Stuart Board Index (SSBI), an annual compilation of board statistics from 500 top corporations worldwide, says Julie Hembrock Daum, co-managing director of U.S. board services for the San Francisco firm.

Estrin agrees, adding that companies with women directors tend to better recognize, promote and recruit women. Still, it's a goal that's meeting only moderate success in the IT industry. Only 54% of Spencer Stuart's HT 100, an index of 100 leading high-tech corporations, have a woman director, compared with 98% of the 500 mixed-industry SSBI firms. The problem? It's a Catch-22. Because most women in the industry don't have CEO experience, they don't get board seats. And because they don't have a voice on the board, companies continue to overlook women for CEO positions.

While that's been the prevailing trend, Estrin says it's starting to change. "Clearly, companies today are interested in diversity and adding a woman to the board," she says.

Yet few women — or men for that matter — have the kind of experience Estrin does. With her husband, William Carrico, she's founded three IT companies: Bridge Communications, Network Computing Devices and Precept Software. The last, acquired by Cisco in March 1995, landed her the job as Cisco CTO.

That acquisition demonstrates one of the pitfalls the multiboard member faces: conflict of interest. It's an issue that boards take seriously, particularly at public companies, in which directors have legal and fiduciary responsibilities to shareholders. For Estrin, working for Cisco while being a board member of Sun is a balancing act.

"When Cisco acquired Precept, I went to [Cisco CEO and President] John Chambers and [Sun CEO] Scott McNealy and asked if they had any issues with my being on Sun's board. We decided that it would benefit both companies, and if any issues came up we would re-evaluate," she says.

That's the typical reaction when conflict-of-interest issues arise, agrees Winsten Chen, who held a board position for Intel long before retiring four years ago as CEO of custom integrated circuit manufacturer Solectron in Milpitas, Calif. Board members will leave the room or abstain from a board meeting if a major decision involving two companies they direct comes to a vote, Chen says.

"We do have to be careful because we have a very good monitoring system — the Securities and Exchange Commission — and insider trading laws," he says.

Some executives who hold multiple directorships at top IT corporations include:

- Chen, who retains a seat for Solectron and is a director of Intel, Edison International, and is on the boards of Santa Clara University and Stanford University. Chen is an angel investor of the more heavenly kind. He created and chairs the Paramitas Foundation, an organization that dispenses some $40 million annually in grants to worthy causes.
- Richard Hackborn, the colorful former Hewlett-Packard executive, directs Microsoft and HP. Legend has it that Hackborn turned down the top executive position at HP to live quietly in Des Moines, Iowa.
- Alex Mandl, former chief operating officer of AT&T, is currently the president of Teligent, the happening provider of broadband local wireless services. Mandl is a director for Dell, Warner-Lambert Co., Forstmann Little & Co., General Instrument, the Walter A. Haas School of Business at the University of California at Berkeley and Willamette University.

GOOD COUNCIL

Why do these obviously busy people choose to serve on multiple boards? Most say they learn as much as they teach.

"Being on those boards, learning their issues, understanding and contributing to their successes, is a broadening experience," Mandl says. "Teligent's background is the telecom perspective. But sitting in a board meeting at Dell gives enormous insight on the PC business, what's driving technologies in that industry and how the marketplace is impacting that business."

Despite the benefits, the multiboard member is a rarity. People tend to serve on fewer boards in the high-tech industry than they do in other industries. Some top high-tech companies, such as Compaq, even restrict the number of boards on which their members may sit.

Moreover, technology companies lead the trend of having smaller boards. As of 1997, Spencer Stuart's top 100 technology companies averaged four fewer directors than those in the broader SSBI index, which averaged 13 directors.

High-tech companies have learned that a smaller, more manageable board makes for a nimble, fast-acting company, says Kenneth Roman, board member for Compaq and former chairman of advertising firm Ogilvy & Mather Worldwide in New York. Likewise, fewer people per board means each seat carries more responsibility and thus, more work. So companies prefer that their board members not stretch themselves too thin.

Meanwhile, other industries have begun raiding high-tech CEOs for their boards. That's how Estrin found herself on the boards of Federal Express and Disney — companies pressing ever-further into technology. For these corporations, Estrin's role is to be a sounding board for technology initiatives, such as Year 2000 fixes.

"IS issues have historically not been high-level board issues. That's changing," Estrin says.

A board's true work is usually subtle. Members are tasked with making sure corporate management works well. That means offering advice when it's needed but staying out of day-to-day operations if all is well.

"If things are not going well, the board's role is to see what can be done to put things back on the proper course, including the question of leadership," Mandl says.

Likewise, good boards are watchdogs for all the company's constituents, Chen says.

> "Clearly, companies today are interested in . . . adding a woman to the board."
> Judith Estrin, senior vice president and CTO, Cisco

"A board has the function of overseeing the whole company's business and to really watch out and make sure the company is properly serving its shareholders, employees, the community, its customers and suppliers," he says. To do that, boards must ensure that the company has a good long-term strategy, operating plan and a management team that will meet or exceed goals.

Conversely, external signs that a board isn't at peak performance include its composition, its compensation and its attitude.

A board that is composed of too many finance executives, investors and venture capitalists doesn't offer the necessary balance, Dow says. Financial people may have great ideas but lack the management expertise to know if their ideas are executable.

Also, boards that have too many "insiders" — people who also have management positions in the company — are at risk. Company managers can turn into yes-people to the corporate president, rather than watchdogs, Roman says.

Boards that don't tie the director compensation to the performance of the company generally tend not to perform as well as those that do. That's why most boards pay members in stock options, Spencer Stuart's Daum says.

Good directors, therefore, view their role as integral but hands-off.

"I jokingly compare it to being a grandparent," Estrin grins. "You get to vicariously share in the success of the company, but you can't tell the CEO how to run it." ▲

Modernize Your Network Without Trashing Your X.25/Async/SNA Equipment!

Get More with RAD's Packet Switches!

- Smooth Transition
- Minimize Downtime
- Cost-Effective
- IP Routing
- Comprehensive X.25 Support
- Full FRAD Capabilities
- Multiple QoS Mechanisms
- Reliable
- Flexible
- Compact
- Network Management Capability

SPECIAL LIMITED TIME OFFER!
Call 1-800-444-7234 Today for FREE Packet Switching Evaluation Unit!

RAD data communications

http://www.rad.com e-mail: market@radusa.com
Toll Free: 1-800-444-7234 International: Telephone: 972-3-6458181 RAD Data Communications, Inc.

Free Product info enter NWInfoXpress #100 online @ www.networkworld.com/infoxpress

Do your excuses matter when the server goes down?

LogCaster
RippleTech
The First & Only True SuperSet™ Real-Time monitoring software that meets virtually all industry standards.
LogCaster
RippleTech

You bet your char-broiled buns they don't!

Monitor the slightest ripple on any network component with LogCaster®

Get the whole truth...

LogCaster® is the first and only real-time monitoring program that meets virtually all industry standards. With LogCaster you get a SuperSet™ program that monitors your applications, hardware, and system administrative functions – making sure your network is secure and running at peak efficiency.

Finally a single affordable software program that has it all! LogCaster® monitors the Windows NT® Server event logs, takes corrective action when necessary, and notifies you if any component on your network or system is not operating efficiently or there is unauthorized activity. Comprehensive and easy to manage, it is also adept at TCP/IP monitoring. For more information or to order, call (215) 321-9600, or visit us at:

www.rippletech.com

RippleTech®
NOTHING BUT THE TRUTH

RippleTech, RippleTech logo and LogCaster are registered trademarks of RippleTech, Inc., Washington Crossing, PA, (215) 321-9600. Windows NT is a registered trademark of Microsoft Corporation.

Free Product info enter NWInfoXpress #101 online @ **www.networkworld.com/infoxpress**

One advantage to not having old technology.

We don't have to try selling it to you.

Unlike communications companies that have been around forever, we're not stuck with an outdated network we'll try dumping on you. Whatever you need: Frame Relay, ATM or IP, Qwest is the network that delivers it better. Because Qwest is the network with bandwidth to spare. So if you're looking for a better return on your IT investments, visit us at **qwest.com** and find out why *not* having old technology can work to your advantage.

ride the light

Qwest.

Free Product info enter NWInfoXpress #99 online @ **www.networkworld.com/infoxpress**

Making bandwidth 'free'

Industry watcher Thomas Nolle shares his view on what would most revolutionize the network business and have the biggest impact on the future of our Network World 200 companies.

Free bandwidth — what a concept! Nothing would revolutionize communications as much as it would.

Unfortunately, free bandwidth is impossible to reconcile as a money-making model for carriers. Fortunately, developments in networking are going to offer limitless bandwidth under terms users and carriers can live with.

These developments will change the world, making many of the things we now do without network support — from meeting customers to buying custom music CDs — possible on the network.

Recent advances in optical networking — particularly dense wave division multiplexing (DWDM) — make it clear that the cost of optical information transport is dropping to the "cents per megabit-per-second" level. But service providers have had no incentive to invest in this technology given the fact that it would lower service prices.

If bandwidth is free, nobody will want to sell it and so no one will invest in creating that free-bandwidth state, so the theory goes. The truth is more complicated. If bandwidth is free, nobody will want to sell bandwidth, but selling services based on bandwidth would be fine. We can make bandwidth free if free bandwidth is somehow walled off behind a barrier we call "services."

SERVICE BY PROXY

The thing that makes a limitless-bandwidth network possible is a service proxy — hardware or software that sits between a user and the Internet or other public data network and communicates with the user to secure network resources such as bandwidth.

A voice service proxy would draw bandwidth from the network's pool to support voice calls; it would draw on additional resources for calling features such as 800-number dialing. A CD-by-Internet proxy would draw on bandwidth to deliver content to a shopping mall kiosk at which a CD read/write drive would burn custom tracks for a buyer.

A service proxy can validate the user of the network service and limit the user's interactions with net resources. The service proxy makes it impossible to use CD-by-Internet bandwidth to support voice calling, so the cost of the new CD-by-Internet service can't drive down expenses and profits on voice calls. This protects the service provider's current revenue while creating new revenue opportunities. With the promise of new revenue, service providers can justify investment in DWDM technology, and the limitless-bandwidth concept makes economic sense.

Service proxies actually aren't a new idea. In fact, all the products aimed at providing voice services over the 'Net are service proxies. The products interact with a voice user using voice-calling procedures, then negotiate network connections and transport voice using Internet rules. A service proxy speaks the language of the network and the language of the user/service, acting as an interpreter between the two.

If service proxies aren't new, and if this idea is really workable, why don't we have CD-by-Internet today? There are two reasons.

The first is a service problem. Carriers already sell bandwidth in the form of T-1, T-3, OC-3 and even higher leased lines. And they've been steadily dropping prices to encourage users to buy more bandwidth.

But now, facility-based carriers such as AT&T, MCI WorldCom and Sprint have found themselves selling leased-line bandwidth more often to competitive carriers than to end users. If they maintained this "bandwidth to all" selling practice, they'd be building CD-by-Internet service opportunities for other carriers.

The second is a regulatory problem. The regional Bell operating companies are required to wholesale the elements of retail network services to competitive local exchange carriers (CLEC). This might make it hard to protect the limitless-bandwidth network's service prices; CLECs could simply acquire wholesale bandwidth and undercut RBOC prices.

Fortunately, these problems will be resolved within a year. Facility-based carriers have already stopped reducing the cost per bit on higher-bandwidth leased lines. Instead, carriers are moving users to frame relay, ATM or IP virtual private networks (VPN), offering service-level agreements rather than bandwidth. In short, these networks are based on the service proxy concept. And RBOCs are about to break themselves up into wholesale-only regulated divisions and competitive retail data and CLEC divisions. The latter will develop limitless-bandwidth applications, such as CD-by-Internet.

WHAT'S IN STORE

First, service economies will increasingly favor value-added services rather than leased-line, bandwidth-only services. Users should expect to migrate to frame/cell or IP VPNs because the terms for those networks can be made favorable.

Second, users should expect service "filters" that will discourage or prevent the use of one service to support traffic of another. IP-based applications, for example, can be made less expensive only if the services aren't usable for voice transport. Otherwise, the service provider cuts its profits.

That's the real impact of the service proxy. A service proxy will be used to create specialized user-to-network relationships. The proxy will apply technical features to limit its use to the specific application it's designed to support. This will open the opportunity to deploy thousands of new network-based applications generating hundreds of billions of dollars per year in new revenue.

High-quality virtual conferences will be an alternative to air travel. And push technology could be used to distribute everything from breaking news to software updates. These have been suggested, but the current network business model has prevented their exploitation. The service proxy model will encourage these applications because carriers will make money, and that will spur massive investment in optical technology.

This shift will occur as soon as 2001 or as late as 2010. Understanding the truth will help make the earlier date a reality: A business never invests to lose money, so the only path to creating free bandwidth is the path that leads to carriers selling not bandwidth, but service.

Nolle is president of CIMI, a technology assessment firm in Voorhees, N.J. He can be reached at (609) 753-0004 or tnolle@cimicorp.com.

“I received so many calls and emails I did not have time to look for a new contract through the old conventional methods (mailing, faxes and job fairs). I found a new great contract in less than a week.”

high tech jobs www.dice.com

dice.com
High tech jobs online

NETWORK SECURITY/ENGINEERING

As one of the premier providers of internetwork consulting east of the Mississippi, RPM Consulting bases much of its success on hiring the best people and then giving them the training and employment opportunities to become even better.

We currently are seeking senior and mid-level engineers in the following disciplines for East Coast and Midwest positions.

- ***Network Security Design/Implementation***
- ***Network Management Design/Implementation***
- ***Internetwork Design/ Implementation***
- ***WAN Design/Implementation***

For additional information, please visit our website www.rpm.com or mail/fax your resume to:
RPM Consulting, 7130 Minstrel Way, Suite 230,
Columbia, MD 21045 Attn: NW
Fax (410) 309-6070
Or send your resume electronically to:
NW@rpm.com

Web site: www.rpm.com

RPM CONSULTING

Feedback

Have an idea for the Networking Careers section?

Send your comments, ideas, and suggestions to ccapp@nww.com

Software Engineers to design, develop, test, implement, maintain and support software systems in the fields of image processing, image compression, graphical user interfaces (GUI) and database applications using object oriented analysis and design (OOAD), C, C++, Visual C++, MFC under Windows NT, Windows 95 and UNIX operating Systems using Open Database Connectivity (ODBC); perform third party software evaluation and integration and develop applications for production and GDI printing; develop digital image processing applications using color management; review quality for projects in an ISO 9000 certified SEI-CMM level 3 Quality Management System (QMS). Require Masters degree or its foreign equivalent in Computer Science, Computer Applications or related field with one-year experience in the job offered. 80% traveling required. Salary Range: $60,000 - $65,000 per year, 8 am to 5 pm, M-F. Send resume to: Venkatesh Ramamoorthy, Vice President, Cosyne Enterprises, Inc., 3235 Satellite Blvd., Bldg. 400, Suite 300, Duluth, GA 30096.

TECHNICAL PROFESSIONALS

Who’s building one of the most advanced fiber optic networks in the world?

Time’s Up!

It’s Qwest Communications.

The Qwest Macro Capacity℠ Fiber Network is designed to be the highest-capacity digital infrastructure in the world. It transmits with unprecedented speed, reliability and affordability, and when completed, the network will be the communications backbone of digital America.

If you’re an ambitious, goal-driven engineering or technical professional, now is the time to ride the light with Qwest. We’re an aggressive company that’s not afraid of big time challenges, and we look for these same qualities in our team members. We’re currently seeking the following: IP Engineers • Telecom Engineers • IT Systems Engineers • Telecom Provisioners • Network Planners • Transport Engineers • Building Engineers • Web Developers • Software Engineers • Network Control Technicians • Operation Process Engineers • General Business, National Accounts, and Data Sales Professionals

Find out for yourself why *Network World* named Qwest the fastest growing IP employer of 1998. Send your resume indicating desired location to: recruiting@qwest.com EOE/AA

ride the light

Qwest.

www.qwest.com

© Qwest Communications, Inc., 1999

AROUND HERE YOU'LL DO MORE THAN JUST MAKE A LIVING.
You'll make a difference.

The freedom to create. The power to innovate. These are the kinds of differences you'll see at SBC Communications, the parent company of Southwestern Bell, Pacific Bell, SNET, Nevada Bell and Cellular One. That's because we approach things a little differently. By empowering you to make important decisions. And developing new products and services that give our customers new ways to access their world. With your help we'll make even greater innovations possible. So bring us your ideas. And **bring IT all together at SBC Communications**.

Richardson, TX (N. Dallas)
Programmer Analyst • Analyst – DBA • Analyst – PC Development • Systems Analyst (Dallas Area)

St. Louis, MO
Mainframe/Mid-Range/Object-Oriented Application Developers • Powerbuilder Application Specialists
C/C++ Application Programmers • Oracle Database Administrators • Website Developer/Webmaster

San Ramon, CA
Sr. UNIX Systems Administrator • UNIX Systems Analysts • TANDEM Systems Analyst • UNIX Server Engineer
Sr. COBOL Programmer Analyst • Network Security Consultant (Dublin, CA)

For details on these and other IT positions, please visit our IT web pages.

www.bringITtogether.com

SBC Communications is an Equal Opportunity Employer. All qualified applicants will receive full and fair consideration for employment.

SBC
SBC Communications Inc.

Southwestern Bell PACIFIC BELL. SNET NEVADA BELL. CELLULARONE

intermedia
COMMUNICATIONS

Intermedia Communications, one of the nation's fastest growing communications companies, has opportunities for:

Sales, Sales Engineering, IS, Engineering, Field Operations, Network Operations

We are seeking innovative, "Can Do" people!

Intermedia is the nation's largest independent CLEC and a tier-one ISP. Our products and services encompass the broadest range of networking solutions available from any single supplier. We are seeking high-energy, "Can-Do" people. Qualified candidates should be flexible, multi-task and detail-oriented team players able to meet deadlines and deal effectively in a fast-paced environment. Telecommunications experience a plus.

Be a part of a dynamic team with excellent
benefits and great earnings potential!
Fax resume to: (813) 829-7707
Or email: resume@intermedia.com Attn.: EADAPRNW

EOE

www.intermedia.com

NetworkWorld

Over 1 Million Readers. Viewers, Attendees

Online Advertising Options

Highly Specialized Career Fairs

1-800-622-1108 Ext. 7454 Recruitment Advertising

MAY HIGHLIGHTS

May 3 - Ad Close: April 23
Networks of the Future.

May 10 - Ad Close: April 29
Buyer's Guide: Ethernet backbone switches.

May 17 - Ad Close: May 6
New directions for call centers.

May 24 - Ad Close: May 13
The anatomy of a SLA.

May 31 - Ad Close: May 20
Application hosting services.

Talk To Network World

ONLINE RECRUITMENT ADVERTISING

NetworkWorld Fusion

Network World Fusion offers a wide range of advertising options to optimize your recruitment efforts!

Network World Fusion brings print and on-line media together in a powerful and unique package. Fusion spotlights key news and feature articles from the print edition of Network World, adding another dimension for your ongoing recruitment efforts

From our viewers...

"It seems that career management is getting more important than ever before – and I think you have done a commendable job with Career Advisor. I hope you can manage to keep it going next year!"

"I find the Newsletter quite useful in managing my career."

For more information on Online Advertising Programs (800) 622-1108 Ext. 7454

www.nwfusion.com

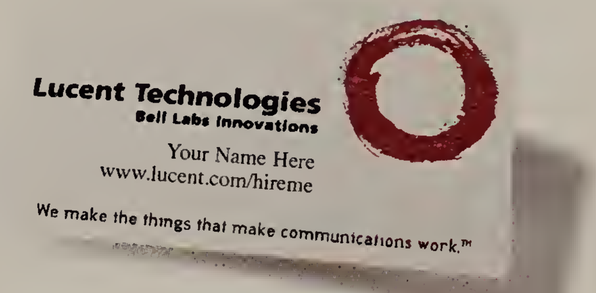
WELCOME TO LUCENT. Custom career pathing. Global opportunities. The freedom to explore your options. It's what life at Lucent Technologies is all about. We give you the opportunity to move among the company's many business units, choose a mentor on your own terms and make the most of your career. Come to think of it, isn't that what you deserve?

From performance-based compensation to stock purchase plans, Lucent offers one of the most comprehensive benefits programs in the industry. You'll also enjoy exceptional amenities and options like telecommuting, health fitness centers, and extensive continuing education opportunities. Define your own future. Apply today. For current listings and full job descriptions, please visit our web site and apply on-line at: **www.lucent.com/hireme.** Lucent Technologies is an Equal Opportunity Employer.

Qualified graduates will be considered for positions in a variety of areas, including but not limited to:

- **Development & Testing**
- **Engineering**
- **Information Systems**
- **Marketing & Sales**
- **Product Design & Support**
- **Research**
- **Technical Support**

NetworkWorld 200



define the future.

Got Hiring Needs?

Talk To NetworkWorld

800-622-1108, ext 7454

USER SUPPORT ANALYST SUPERVISOR: Supervise and coordinate activities of workers who provide problem-solving support to computer software users. Solves non-routine software, hardware,and procedure problems,using computer and manuals. Determine requirements for new or modified software and hardware. Writes recommendations for management review. Coordinates installation of hardware and software, and implementation of procedure changes for customers. Programming skills include AS/400 platform and AS/400 Operating System, all active release levels. RPGIV,RPGIII, RPGLE,CL,Query,SQL,SDA, SUB File Processing,DFU. Min. Req.;B.S. in Comp. Sci. + 2 yrs. Exp. in inventory management; $68,000.00 p/y; 40 hr. p/w. Apply: E3 Corp.,1800 Parkway Pl., #600, Marietta, GA 30067-8288.

Software Engineer, 40 hrs/wk, $58,469.84/yr. Design software for monitoring transmission signals and automating operations using Use Cases methodology. Use C/C++ and JAVA computer languages, Install-D and CodeWrite tools to write source codes on the multitasking operations system in the Windows NT Operating system. Use Microsoft Assembler to troubleshoot and maintain company products. Participate in call processing, message routing, timeslot usage optimization, fault management, and system monitoring to test company products. Min reqs: Master's in Comp. Sci. & 6 mo. experience. in computer programming in C/C++. Apply at the Texas Workforce Commission, Fort Worth, Texas, or send resume to the Texas Workforce Commission, 1117 Trinity, Room 424T, Austin, Texas 78701, J.O.#TX0520222. Ad Paid by An Equal Opportunity Employer.

Maximizing the Power of the Internet.

Today, the world's top websites look to **Frontier GlobalCenter** for their digital distribution services. Over 70% of online financial discussions and 60% of all internet searches are facilitated by the power of our network. And companies like SuperShuttle and China Mist Tea turn to us for reliable, Internet-based WAN connectivity to support their business goals.

one of the COMPUTERWORLD BEST PLACES TO WORK 98

Right now, Frontier GlobalCenter is building a facilities-based OC-48 backbone for our IP Traffic. We're looking for a few exceptional people to manage our network from our Network Control Center in Sunnyvale, CA:

- **National Director, Network Control Center (99-0519)**
- **MDC Network Control Center Manager (99-0618)**
- **MDC Facility Manager (99-0616)**
- **Network Technician III (99-3333)**
- **Sr. Operations Engineers (99-0374)**
- **Product Engineer (99-0513)**

We also have select network opportunities in our various facilities nationwide:

Phoenix, AZ
- **Media Distribution Center Manager (99-0514)**
- **Network Technician III (99-4339)**

Herndon, VA
- **MDC Network Control Manager (99-0516)**
- **Network Technicians I, II, III (99-0615)**

New York, NY
- **Network Technician III (99-0363)**

frontier GLOBALCENTER

For more information visit
our website: www.globalcenter.com

We offer competitive salaries, excellent benefits, and a work environment that's conducive to your continuing professional growth. Interested candidates should forward a resume with salary history and requirements to: **Corporate Staffing-JM, Frontier Corporation, 180 South Clinton Ave., Rochester, NY 14646; FAX: 800-676-3728; Email: jmccue@frontiercorp.com** We value diversity in the workplace.

Unconventional
Wisdom

If at first you don't succeed

can you afford

to try, try

again?

Trial and error is expensive when it comes to [illegible] the right enterprise security software. Now there's Conclave–the one fully-integrated Intranet/Extranet security solution that actually gives you everything you need. A firewall, a dynamic VPN, secure remote access, enterprise access. All with Conclave's Universal Policy Environment, *the* policy framework for enterprise network management.

Try Conclave for Free

Don't take our word for it. Get your own Free Conclave Product Evaluation Kit. Just call our toll-free number: 1 877 / CON-CLAV (266-2528) or visit our website at www.conclave.com.

Look for us in Booth Nº 3270 at the Networld + Interop Show in Las Vegas, May 11-13, 1999.

CONCLAVE™
Intranet/Extranet Accessware

©1999 Internet Dynamics

A product of Internet Dynamics

#326 @ www.networkworld.com/infoxpress

Matrix KVM Switching . . . Simplified

Demand Raritan.

Raritan
www.raritan.com

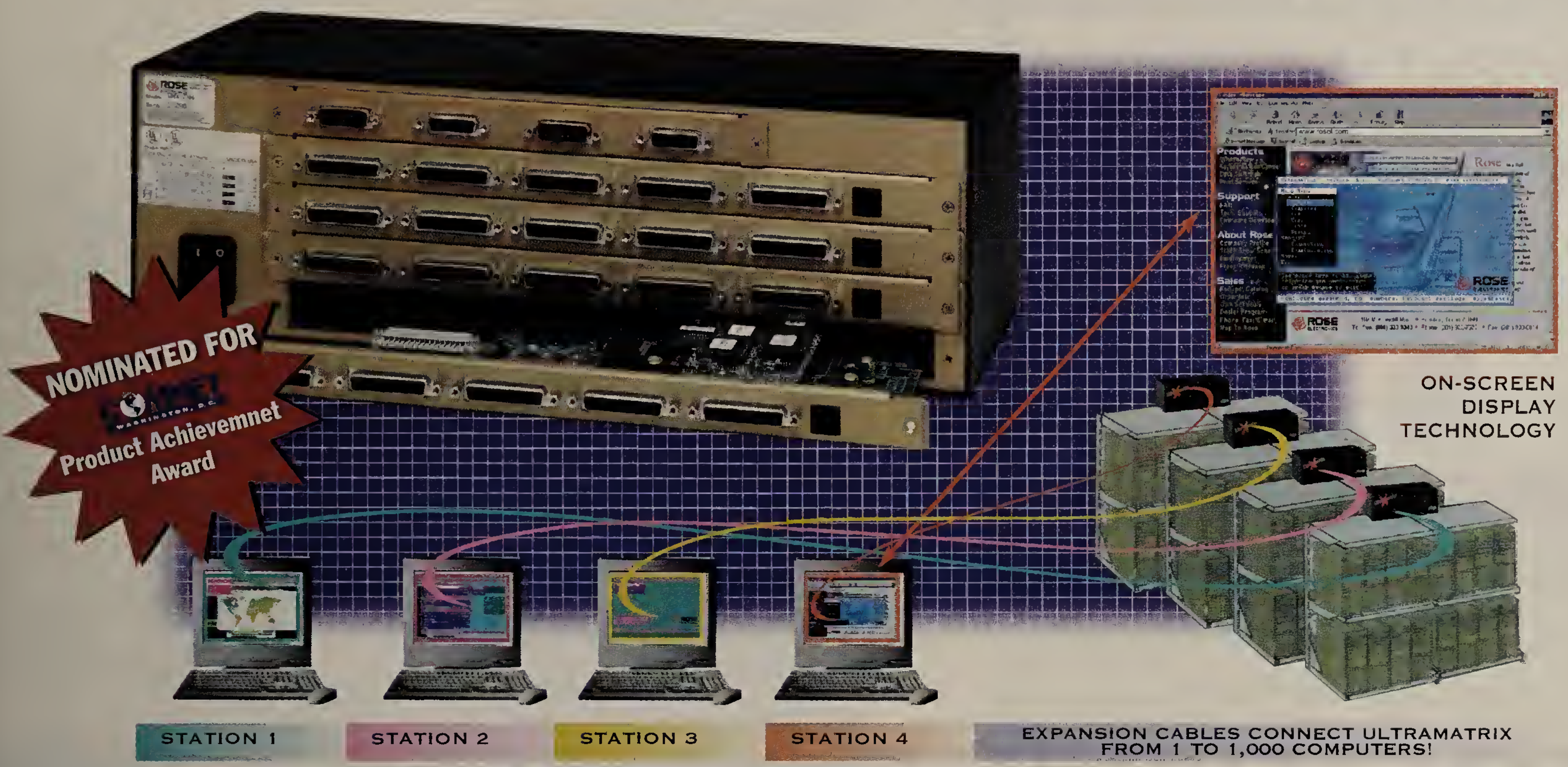
1-800-724-8090, X90
Phone: 732-764-8886 Fax: 732-764-8887
E-mail: sales@raritan.com

Get a hands-on demo at: COMDEX SPRING, Chicago, IL, April 19-22, Booth #C1335

#314 @ www.networkworld.com/infoxpress

Celebrating our 15 Year Anniversary

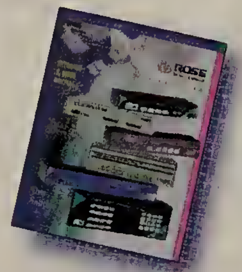
MANAGE 1,000 SERVERS
from 4 or more KVM stations



NOMINATED FOR
COMNET
WASHINGTON, D.C.
Product Achievemnet Award
ON-SCREEN DISPLAY TECHNOLOGY
STATION 1
STATION 2
STATION 3
STATION 4
EXPANSION CABLES CONNECT ULTRAMATRIX FROM 1 TO 1,000 COMPUTERS!

Rose has done it again! The UltraMatrix is a keyboard-video-mouse (KVM) switch that has all the features, is the simplest to use, and costs the least.

Call 800-333-9343 for your catalog



- Simultaneous access from 4 or more KVM stations
- Supports multiple platforms: PC, Sun, Unix, others
- Full keyboard and mouse emulation for automatic booting
- Expands easily with plug-in cards
- Sleek on-screen display simplifies user interface
- Innovative cabling system makes installation clean and easy
- Uses less rack space than other switches
- Security, access groups, user profiles, status screen, flash memory, and more

GROW WITH
ROSE PRODUCTS

Rose has been providing innovative solutions since 1984. We have a complete line of KVM switches for server rooms, classrooms, desktops, and other uses. Ask us about our KVM extenders using coax or twisted pair. We also have an extensive line of serial and parallel data switches. Call us today to discuss your application.

ROSE ELECTRONICS
WWW.ROSEL.COM

AEROSPACE/MILITARY

COMPUTER ROOM

PLANT CONTROL

TRADING ROOM

CONTROL CONSOLES

CLASS ROOM/CORPORATE

USA OFFICE: 10707 STANCLIFF ROAD HOUSTON, TEXAS 77099 PHONE 281-933-7673 FAX 281-933-0044
UK OFFICE: PHONE +44 (0) 1264 850574 FAX +44 (0) 1264 850529

ON-LINE PRICING AND ORDERING SERVICE

Telco Exchange - Netscape
File Edit View Go Communicator Help
About | Feedback | Help
Ordering Center | Submit URL
TELCO EXCHANGE
National ISDN Council
Telco Exchange Pricing
DIGITAL LINE PRICING
INTERNET SERVICES PRICING
TELCO EXCHANGE ordering center
Document: Done

What's the BUZZ?

REAL TIME QUOTES!!!

TELCO ORDERING ON-LINE!!!

info@telcoexchange.com

Check availability...
nationwide

Compare prices...
multiple tariffs

Order digital service...
fast and secure

On the web...
24 x 7

t1-t3

dsl

isdn

frame relay

internet services

network solutions

877.988.6484

TELCO EXCHANGE™ www.telcoexchange.com

#303 @ www.networkworld.com/infoxpress

Reboot and Access Remote Equipment With ONE PRODUCT

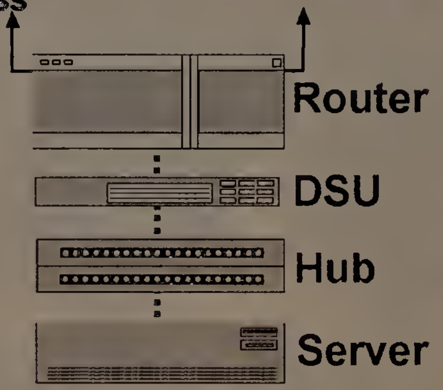
FEATURES

- Power Control, reboot or turn on/off remote equipment
- RS-232 Console/Aux port access to remote equipment
- Dial-up access with internal 33.6 kbps modem
- Telnet access with internal network interface
- Local console for onsite access to connected equipment

DS4D-RPC (Rear View)

ELIMINATE COSTLY REMOTE NETWORK SERVICE CALLS with BayTech's complete line of remote site management products.

These products will help keep your network running.



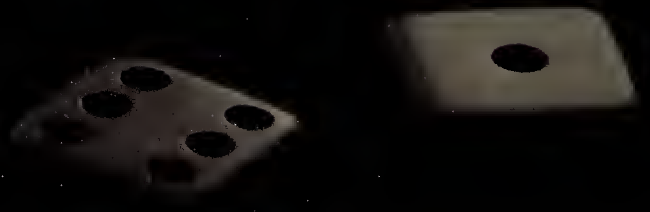
Also available, seperate power control and console access solutions

BayTech 800-523-2702 www.baytechdcd.com
International: 228-467-8231 Fax: 228-467-4551

#262 @ www.networkworld.com/infoxpress

Why gamble on your WAN interface?

Visit us at N+I Vegas '99 BOOTH #8602



www.sdlcomm.com

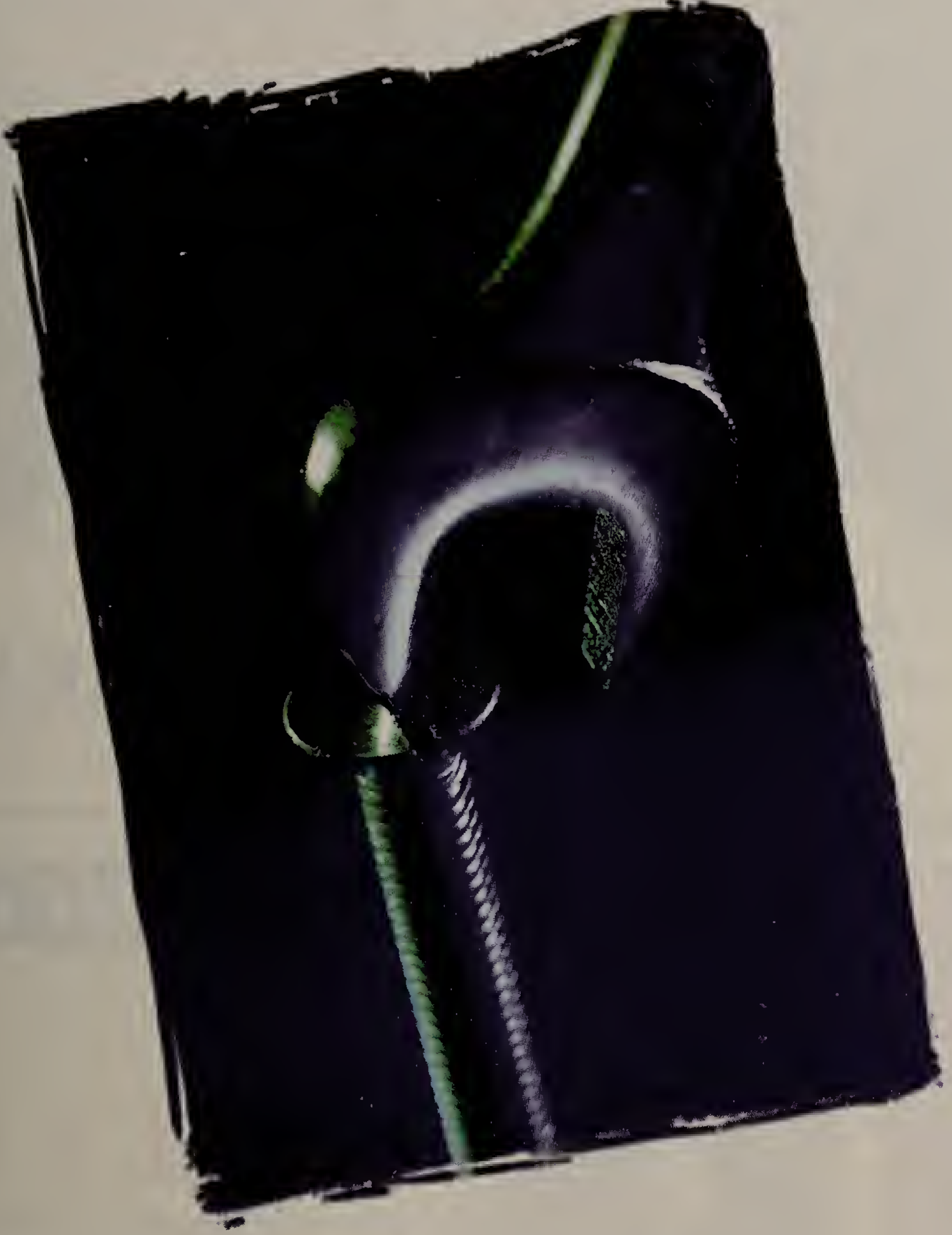
Partner with the global leader in OEM PCI, CPCI and PMC WAN adapters to reduce your time to market and fully optimize scarce engineering resources.

SDL Communications, Inc.
The uplink company
46 EASTMAN STREET, SOUTH EASTON, MA USA 02375 PHONE [508] 238-4490 FAX [508] 238-1053

PICMG® and the PICMG™ logo are trademarks of the PCI Industrial Computers Manufacturers Group. All other logos & trademarks are property of their respective owners.

#277 @ www.networkworld.com/infoxpress

When your old network monitoring tools don't fit anymore...



You've moved from a traditional SNA environment to TCP/IP. And you've outgrown your old tools. Bad news. Now that you're on a public network, you'll need to control your environment more than ever.

Are there TCP/IP tools? Of course, but only one solution, **e-Control**, offers you network monitoring, performance management, and problem diagnosis. That's a critical advantage for maximum control. Say a component fails or you have a security violation. With other solutions, you'll only know that a problem exists. With **e-Control**, you'll get the "what, where and how" of the problem, along with proactive alerts to help you avoid career-threatening technical disasters. You can also decide which events to highlight and who to notify in case of trouble, for faster, more efficient response.

e-Control is the perfect fit to keep your OS/390 servers and business running at top speed.

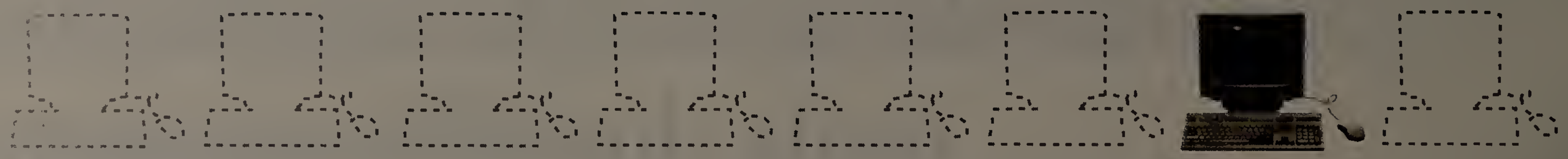
For a free demonstration CD or to order a product evaluation:
visit us at **www.interlink.com/offer**,
eMail us at **offer@interlink.com**, or
call us at **800.366.5452**.

...it's time to take e-Control of your TCP/IP data center.

INTERLINK
COMPUTER SCIENCES™

©1999 Interlink Computer Sciences, Inc. All rights reserved. The Interlink Computer Sciences logo design is a trademark of Interlink Computer Sciences, Inc.

#316 @ www.networkworld.com/infoxpress

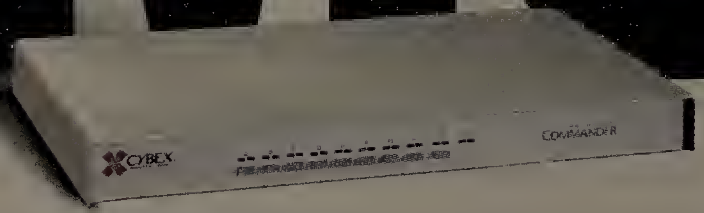


Less is...

Manage all of your servers with just one keyboard, monitor and mouse! The AutoView Commander eliminates the need for peripherals at every computer. Fewer peripherals means less clutter and less wasted money.

MORE Room
MORE Control
MORE Cost-effective
What more could you want?

MORE



Designed for Microsoft® Windows NT®

Yes NetWare.

Contact us at CYBEX (800) 932-9239,
fax (256) 430-4030 or
www.cybex.com

CYBEX® COMPUTER PRODUCTS CORPORATION

Cybex, the Cybex logo, AutoView and Commander are trademarks or registered trademarks of Cybex Computer Products Corporation.

#227 @ www.networkworld.com/infoxpress

E-COMMANDER

NOW WITH 100%JAVA BASED CROSS PLATFORM BROWSER MANAGEMENT SOLUTIONS USING E-MANAGER/NetPrism

- *MANAGE YOUR UPS*
- *CONTROL AC/DC POWER*
- *GATHER ANY ALARM*
- *SERIAL PORT ACCESS*
- *MANAGE ANY HARDWARE*
- *EXCLUSIVE VISIBLE LIGHT LINK AND MUCH MORE*

Come see us at N+I Vegas Booth #8509

1-800-247-1431 www.e-comms.com

E-COMMANDER, E-MANAGER & NetPrism are trademarks of *E-COMMS* & Fujitsu

#327 @ www.networkworld.com/infoxpress

TimePlex Group

Go to the Source

For the lowest price on TimePlex Equipment

All hardware is staged and pre-tested.
If it doesn't say

ISO TimePlex CERTIFIED

then it's not!

Engineering Support
Software/Prom Upgrades
Year 2000 Upgradable

ALL TIMEPLEX EQUIPMENT

FDDI
LINK/2+
LINK/1
LINK/100
CSU
microLINK
miniLINK
ROUTERS
TIME/LAN
TIME/PATH
MICROPLEXER
OEM

1-800-726-LINK ext. 1777

or Fax: 1-727-531-2102

#239 @ www.networkworld.com/infoxpress

Speed and Performance

Router Performance Monitor RPM 3000

Routes and monitors Frame Relay traffic from one device.

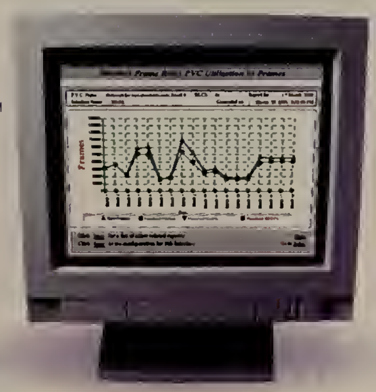
Whether you're a carrier deploying managed services or an enterprise user looking to verify your Service Level Agreements, the Eastern Research RPM 3000 Router/Performance Monitor can make you a winner.

Optimized for frame relay services, the RPM combines the functionality of a remote access Router and a Performance Monitoring CSU/DSU. Its unsurpassed routing features, coupled to extensive network statistics, start you in the pole position; then allow you to set and track the pace.

With the RPM, there's only one device to install, configure and spare. Its modular design adapts to ever-changing network conditions, protecting your initial investment, and its intuitive menu-driven user interface enables rapid setup and easy diagnostics.

When you're delivering or utilizing Frame Relay services, second place isn't an option. Call 800-337-4374 now and discover why Eastern's RPM 3000 leads the pack.

With WANwatcher™ for Frame Relay Statistical Trend Analysis



See us at
Networld+Interop 99
Booth 1773

Eastern Research
Products as Solutions

225 Executive Drive, Moorestown, NJ 08057 1-800-337-4374 609-273-6622 E-mail: info@erinc.com http://www.erinc.com

#225 @ www.networkworld.com/infoxpress

SNMPc Enterprise Manager

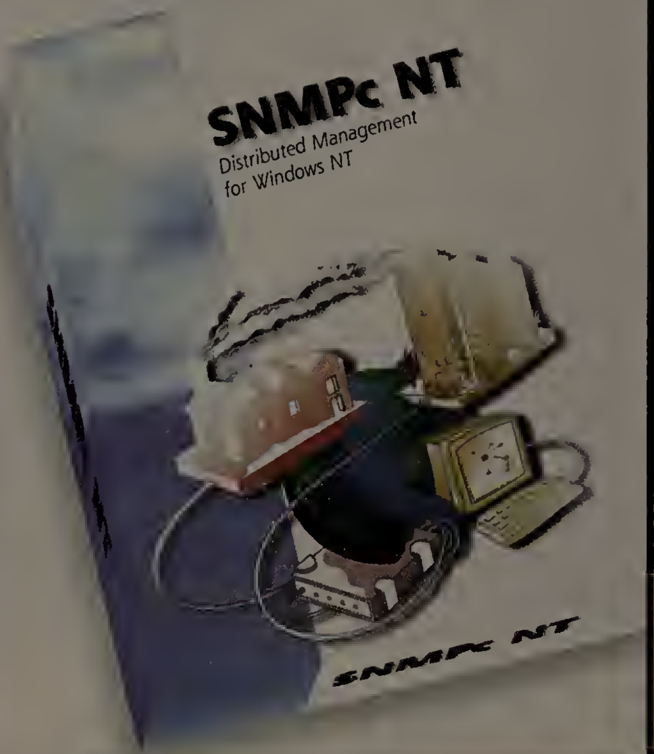
Distributed management for Windows NT. Supports remote consoles and polling agents, Web Trend Reporting and more.

SNMPc WorkGroup Manager

Affordable management for small networks. With an installed base of over 60,000 copies, this popular tool is resold by major OEMs, including Cisco and ACC.

Network Management

for Microsoft Windows



Castle Rock Computing
Phone: 408.366.6540
Fax: 408.252.2379

Download a Free Evaluation
www.castlerock.com

#252 @ www.networkworld.com/infoxpress

LASTAR DATACOMM SOLUTIONS

Call Us Today...Get Connected TOMORROW!

350MHz Enhanced CAT 5 Patch Cords

Description	*MSRP*
3' Datatwist™ 350MHz CAT 5 Patch Cable	$7.95
5' Datatwist™ 350MHz CAT 5 Patch Cable	$9.95
7' Datatwist™ 350MHz CAT 5 Patch Cable	$10.95
10' Datatwist™ 350MHz CAT 5 Patch Cable	$12.95
14' Datatwist™ 350MHz CAT 5 Patch Cable	$14.95
25' Datatwist™ 350MHz CAT 5 Patch Cable	$17.95

Your Choice of Colors: Grey, Blue, Green, Red, Yellow, and Black!

CAT 5 Patch Cords

Description	*MSRP*
1' CAT 5 Patch Cable	$3.35
2' CAT 5 Patch Cable	$3.59
3' CAT 5 Patch Cable	$3.95
5' CAT 5 Patch Cable	$4.45
7' CAT 5 Patch Cable	$4.95
10' CAT 5 Patch Cable	$5.95
14' CAT 5 Patch Cable	$6.95
25' CAT 5 Patch Cable	$8.95
35' CAT 5 Patch Cable	$8.95
25' CAT 5 Patch Cable	$10.75

Your Choice of Colors: Grey, Blue, Green, Red, Yellow, Black, & White!

PCI NICs

Description	*Ref. #*	*MSRP*
3Com 10/100 Auto-Sensing	17583	$89.95
3Com EtherLink XL (10Mbps)	18008	$59.95
Samsung 10/100	17345	$23.95
KTI 10/100 DEC Chipset	15428	$34.95
KTI 10/100 RealTek Chipset	17581	$29.95
KTI Combo 10Base-T	12765	$27.95
KTI MM ST Fiber	18550	$179.95

ISA NICs Are Also Available - Please Call For Part Numbers & Pricing!

Transceivers/Converters

Description	*Ref. #*	*MSRP*
ATI 10Base-T AUI Transceiver	04111	$27.95
ATI 100Base-TX MII Transceiver	12983	$189.95
KTI 10Base-T AUI Transceiver	12763	$21.95
KTI 10Base-2 BNC AUI Trans.	12762	$21.95
KTI 10Base-T/2 Converter	17374	$89.95
KTI 100Base-TX/FX Converter	17378	$389.95

We Also Offer A Full Line Of Products From Transition Networks - Please Call For Latest Part Numbers & Pricing!

Lastar also provides quality services such as network design and installation. Call us today or visit our website for more information!

Call for a FREE Full-Line Catalog!!

Hubs/Switches/Routers

Lastar Carries A Full Line Of Switches From The Industry's Leading Manufacturers Including:

3Com CABLETRON SYSTEMS Cisco Systems PARTNER SAMSUNG KTI NETWORKS

Special Offer - KTI 8-Port 10/100Base-TX NWay Workgroup Switch With Expansion Slot Is Now Only $399.95!! NEW!

Power Protection

Lastar Proudly Features Power Protection Products From

APC AMERICAN POWER CONVERSION TRIPP LITE

Special Offer - Get The New USB/Windows™ 98 Enhanced APC Pro 350 For Only $179.95 NEW!

Structured Cabling Products

Quality Structured Cabling Components From Quality Manufacturers:

AMP Link apw FLUKE HITACHI Hitachi Cable Manchester, Inc. IDEAL MICROTEST MOD-TAP

Lastar Datacomm Solutions

800-291-6031 • www.lastar.net
1501 Webster St.
Dayton, OH 45404
Fax 937-223-6385
8:30am to 6pm M-F • Most Orders Ship Same Day Via UPS

MasterCard VISA Cards

#315 @ www.networkworld.com/infoxpress

GNAT Box

The Simple, Powerful & Affordable Firewall

- Proven Firewall Technology
- Network Address Translation
- Unlimited User License
- High Performance
- Transparent Network Access
- Easy to Configure & Operate
- Remote Web Based Management
- Cost Effective
- Time Based Access Control
- URL & Content Filitering
- Email, Pager & SNMP Trap Alerts
- Email Proxy
- ISDN, xDSL & Cable Modem Support
- Win95/NT Management Client

NCSA CERTIFIED

$ 995.00

1-800-775-4GTA

Web: http://www.gnatbox.com
Email: gb-sales@gta.com
Tel: +1-407-380-0220 Fax: +1-407-380-6080

Global Technology Associates, Inc.

#292 @ www.networkworld.com/infoxpress

Introducing the Router that's easier to configure.

Web Browser Configuration… It's Easier!

Introducing The Emerald, a Frame Relay Access Router to replace all others. Why? Web Browser Configuration! Use Netscape 4.5 or MS IE 4.0 to set up and configure your Emerald. The Emerald allows you to monitor your network from your desktop using the Web Browser you use every day. For less than the price of one week's training on those other routers, you can be up and running in minutes!

Call 800-223-9758 to receive a FREE demo Emerald to try for 45 days. If you're not convinced it's the easiest router you've used, send it back. What could be easier?

Take a look, you'll like what you see.

American Technology 800-777-5511or +1-406-777-5511 fax: 406-777-5512 email: info@atli.com

American TECHNOLOGY
www.atli.com

#302 @ www.networkworld.com/infoxpress

ACHIEVE YOUR VISION...

EXPERIENCE EXCELLENCE
improved operational integrity

DEMONSTRATE QUALITY
impressive designs

ENHANCE PERFORMANCE
human friendly environments

Call the world leader in control center design, consoles and display walls.
1-888-725-9393 / www.econsole.com

EVANS

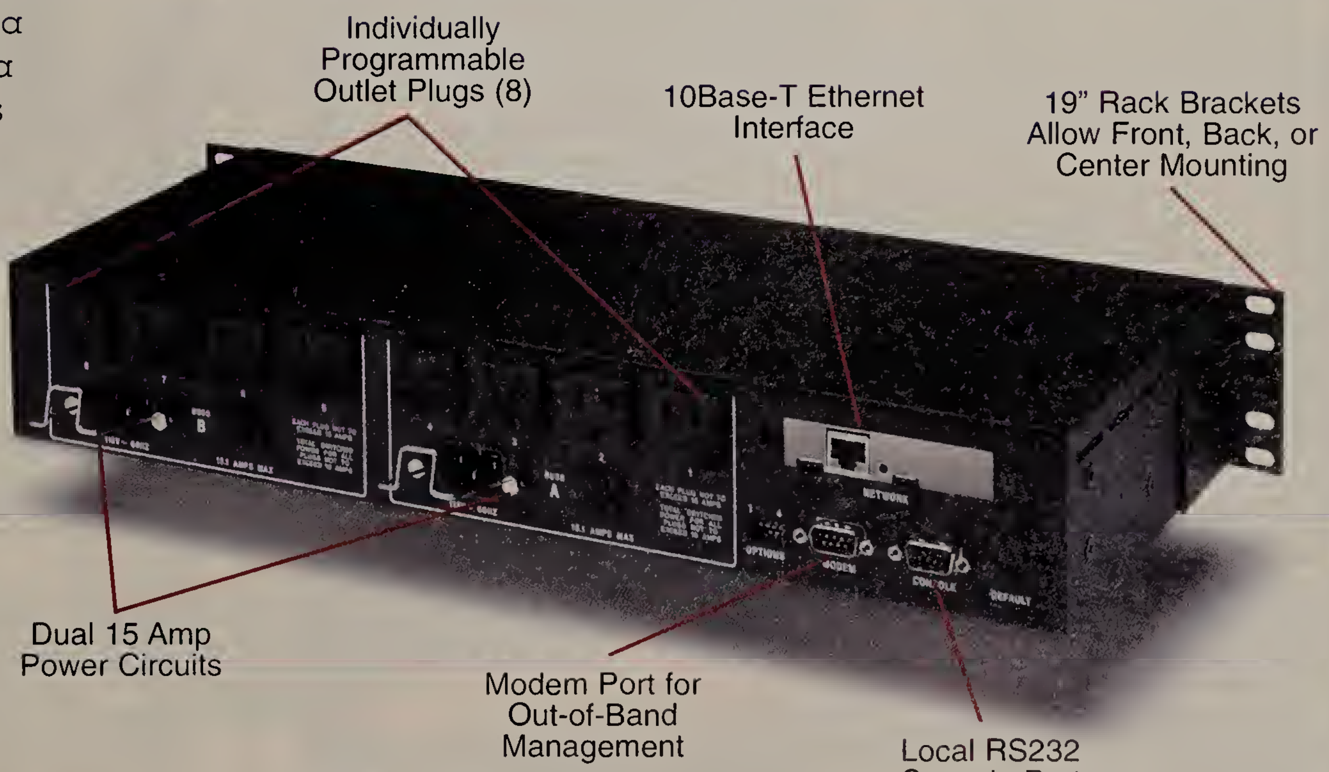
#324 @ www.networkworld.com/infoxpress

Remote Reboot Over Telnet!

Reboot your Network Equipment via Telnet, Dial-Up and Local Console

Network equipment sometimes "locks-up" requiring a service call just to flip the power switch to perform a simple reboot. The NPS Network Power Switch gives network administrators the ability to perform this function from anywhere on the LAN/WAN, or if the network is down, to simply dial-in from a standard external modem for out-of-band power control.

- ✓ TCP/IP Security
- ✓ Individual Plug Passwords
- ✓ Dual 15 Amp Power Inputs
- ✓ Eight (8) Individual Outlets
- ✓ Modem and Console Ports
- ✓ Co-Location Features
- ✓ 115-VAC and 230-VAC Models
- ✓ Modem and Telnet Auto Reset


Individually Programmable Outlet Plugs (8)
10Base-T Ethernet Interface
19" Rack Brackets Allow Front, Back, or Center Mounting
Dual 15 Amp Power Circuits
Modem Port for Out-of-Band Management
Local RS232 Console Port

Come see us at N+I Booth #1573

western™ telematic inc.

(800) 854-7226 • www.wti.com

5 Sterling • Irvine • California 92618-2517 • (949) 586-9950 • Fax: (949) 583-9514

#250 @ www.networkworld.com/infoxpress

Edimax CPU Switch Plus

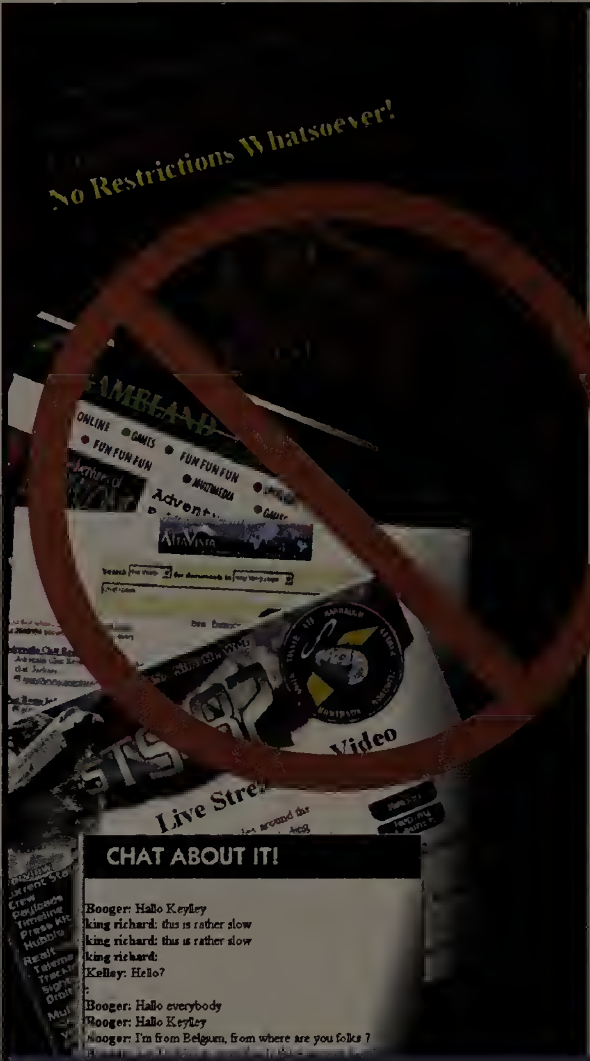
Control multiple PCs from a single Keyboard, Mouse, Monitor, Speakers, and Microphone!

- On-Screen Display
- MS Intellimouse
- Mouse Conversion
- Multimedia Support
- High Video Resolution
- Control up to 128 PCs

EDIMAX
ISO-9001 Company

1-800-652-6776
www.edimax.com

#328 @ www.networkworld.com/infoexpress


No Restrictions Whatsoever!
Video
Live Stre
CHAT ABOUT IT!

Booger: Hallo Keyley
king richard: this is rather slow
king richard: this is rather slow
king richard:
Kelley: Hello?
Booger: Hallo everybody
Booger: Hallo Keyley
Booger: I'm from Belgium, from where are you folks ?

AT HOME, HOW YOU SURF IS YOUR BUSINESS.

AT WORK IT'S OURS.

Immediately increase productivity.

Monitor, report on, or block all Internet access.

LittleBrother™

"Little Brother is watching you use the Internet"

546 Valley Way Milpitas, CA 95035
Ph: 1.800.200.9881 Fax: 408.263.9883 sales@kansmen.com

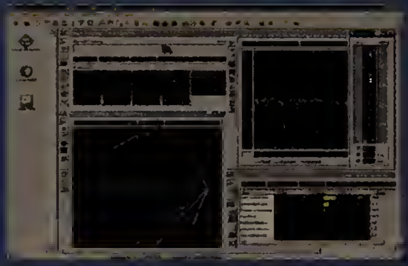
#298 @ www.networkworld.com/infoexpress

INTRODUCING LAN/WAN TROUBLESHOOTING AND PROTOCOL ANALYSIS SOFTWARE SO OBSERVANT, IT CAN SEE ALL PORTS ON YOUR SWITCH.

OBSERVER™

Observer identifies network trouble spots, and costs thousands less than expensive hardware-based analyzers. If you have network slowdowns would you know if they are being caused by packet errors, broadcast storms or overloaded utilization? Find out with Observer or Distributed Observer.

- *Full packet capture and decode for over 300 protocols, including TCP/IP (v4 and v6), NetBIOS/NetBUEI, IPX/SPX, Appletalk, SNA, and DECnet.*
- *Switched mode sees all ports on a switch gathering statistics from the entire switch or packet capture from any port or ports* ***Finally a protocol analyzer that can be used in switched environments!***
- *Long-term network trending collects statistical baseline data for days, weeks, months or years for review and reporting.*
- *Distributed version available for $1290 (includes 1 local and 1 remote Probe). Additional Probes are $295 per local or remote segment or switch.*
- *Network Instruments' optimized ErrorTrack™ NDIS drivers display true errors-by-station. Includes collision expert.*
- *Track router utilization/traffic in real time*
- *Ethernet (10/100/1000), Token Ring, FDDI*



OBSERVER® 6
$995

OBSERVER® EXTENSIONS

EXPERT FOR OBSERVER® $495
WEB EXTENSION FOR OBSERVER® $495
SNMP EXTENSION FOR OBSERVER® $495
RMON(2) EXTENSION FOR OBSERVER® $495

See what you have been missing! Call 800-526-7919 for a FREE DEMO or download from our web site.

www.networkinstruments.com

© 1999 Network Instruments, LLC - Corporate Headquarters (612) 932-9899 FAX (612) 932-9545
[illegible] +44 (0) 1322 303045 FAX +44 (0) 1322 303056 info@networkinstruments.com www.networkinstruments.com
[illegible] Instruments and the "N" logo are registered trademarks of Network Instruments, LLC Minneapolis MN USA

#290 @ www.networkworld.com/infoexpress

It's an Open and Shut Case...

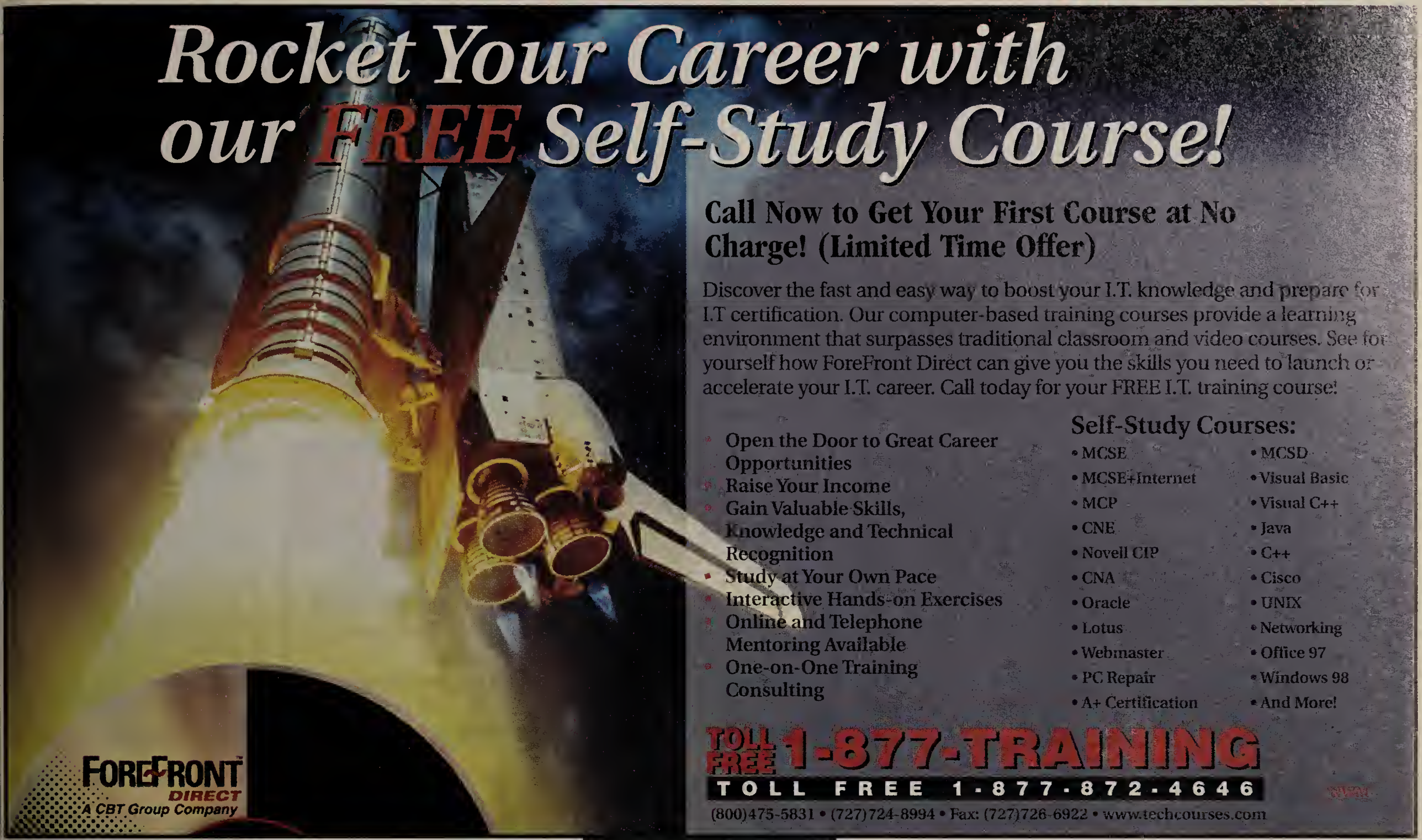
ADVANTAGE 2000 PLUS

Great Lakes
case & cabinet co., Inc.

www.greatcabinets.com

814.734.7303 • Fax: 814.734.3907 • Email: glcc@greatcabinets.com

#274 @ www.networkworld.com/infoexpress



Rocket Your Career with our FREE Self-Study Course!

Call Now to Get Your First Course at No Charge! (Limited Time Offer)

Discover the fast and easy way to boost your I.T. knowledge and prepare for I.T certification. Our computer-based training courses provide a learning environment that surpasses traditional classroom and video courses. See for yourself how ForeFront Direct can give you the skills you need to launch or accelerate your I.T. career. Call today for your FREE I.T. training course!

- Open the Door to Great Career Opportunities
- Raise Your Income
- Gain Valuable Skills, Knowledge and Technical Recognition
- Study at Your Own Pace
- Interactive Hands-on Exercises
- Online and Telephone Mentoring Available
- One-on-One Training Consulting

Self-Study Courses:

- MCSE
- MCSE+Internet
- MCP
- CNE
- Novell CIP
- CNA
- Oracle
- Lotus
- Webmaster
- PC Repair
- A+ Certification
- MCSD
- Visual Basic
- Visual C++
- Java
- C++
- Cisco
- UNIX
- Networking
- Office 97
- Windows 98
- And More!

TOLL FREE 1-877-TRAINING
TOLL FREE 1-877-872-4646
(800)475-5831 • (727)724-8994 • Fax: (727)726-6922 • www.techcourses.com

FOREFRONT DIRECT
A CBT Group Company

#237 @ www.networkworld.com/infoxpress

How Can We Connect Your Business?

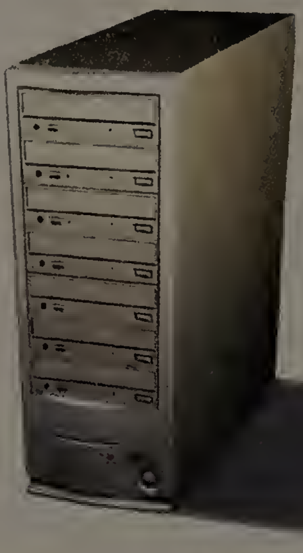
Audio Conferencing
Videoconferencing
Data Conferencing
Satellite Services
Internet Video Streaming

To learn how your organization can harness the technology and increase productivity, call V-SPAN at 1-888-44V-SPAN or visit our web site at www.vspan.com.

V-SPAN®
Virtual Connectivity...Anyplace @ Anytime

1998 ITCA Video Service of the Year
1998 Philadelphia Business Journal's Top 100 Fastest Growing Company
CMA TELCOM 1998 Best of the Best 1998 Best New Carrier Service

#218 @ www.networkworld.com/infoxpress



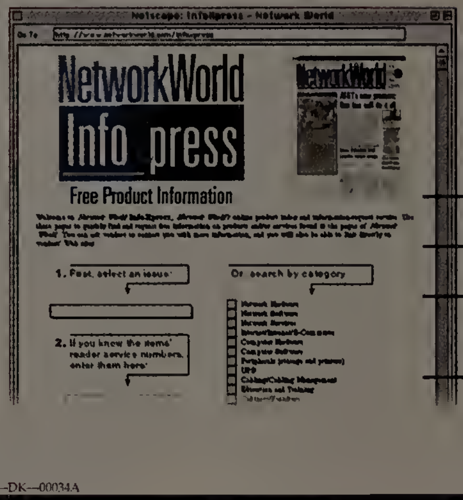
Network Ready
CD-ROM Servers
From $1,749

Excel custom designs powerful, expandable CD-ROM Solutions for Netware, Windows NT and Unix Systems ranging from 7 to 256 CD-ROM Drives.

excel
CD-ROM Systems
888-286-6201
www.excelcdrom.com

#217 @ www.networkworld.com/infoxpress

Try it today at: www.networkworld.com/infoxpress


NetworkWorld
Info press
Free Product Information
1. First, select an issue:
Or, search by category
2. If you know the items' reader service numbers, enter them here:

NetworkWorld InfoXpress is reader service at its best. An online service designed to furnish readers with a quick and easy way to request information, NetworkWorld InfoXpress offers readers:

- Easier access to more relevant information.
- 24-hour service.
- The ability to search for information by reader service number, advertiser name or product category.
- Flexibility in requesting information via mail, email, telephone, fax or linking to the advertiser Web page.

NetworkWorld
THE LEADER IN NETWORK KNOWLEDGE
Print • Online • Events
AN IDG COMPANY

3/99—DK—00034A

NORTEL NETWORKS

"We'd like to cut costs by combining voice, fax and data on our network. But we also want toll-quality voice and instant data access."

"That's precisely what we wanted. And we got it with ClearVoice technology. Now our network gives us the best of both worlds."

ClearVoice* is a remarkable digital compression technology that adds toll-quality voice and fax to your existing frame relay or routed IP network. Intra-company phone calls and faxes ride free along with other LAN and WAN traffic. What's more, ClearVoice takes only a fraction of your network's throughput, so there's no need to add extra bandwidth. Call or e-mail today to receive Nortel Networks' free ClearVoice white paper and get the full story.

Free ClearVoice Over Frame Relay White Paper Offer!

DSC
Datacomm Support Company Inc.
1020 Calle Cardillera, Suite 103, San Clemente, CA 92673 Tel: (800) 388-8953
E-Mail: sales@dscwan.com Website: www.dscwan.com/Reg/SpecialsMain.htm

#319 @ www.networkworld.com/infoxpress

Buy/Sell/Trade, New & Used
NETWORKING
Routers • Switches • Hubs
CISCO, BAYNETWORKS, CABLETRON
ASCEND FORE 3COM CHIPCOM
Visit Our WEBSITE@www.bizint.com

NY Office/Sales:
Tel: (315) 458-9606
Fax: (315) 458-9493

International Resellers of Routers, Switches & Hubs BIZI

Main Office:
Tel: (978) 667-4926
Fax: (978) 663-0607

#219 @ www.networkworld.com/infoxpress

SOFTWARE AT WHOLESALE $$$$$

NOVELL NW-5.0 Upgrades		MICROSOFT	
Server + 5 Connections	$495	Office Pro '97	$185
Any 5 User to 5 Conn: Lic	$395	NT Server 5 Clients	$485
10 Connect: additive Lic	$595	NT Server 10 Clients	$585
25 Connect: Additive Lic	$995	NT Server 20 License	$285
50 Connect Additive Lic	$1495	NT Workstation	$140
100 Connect Additive Lic	$2495	NT Workstation Lic	$95
WE ALSO CARRY FULL VERSIONS OF NETWARE V5.0 GROUPWISE AND MANAGEWISE - CALL FOR PRICING		B/Office Sm:Biz-10 user	$795
		B/Office Sm:Biz-25 user	$1195
		B/Office Server Unltd:	$1785
		B/Office Lic.20 Pak	$1085

Gov't/Schools P.O.s Welcome
SAFE SYSTEMS INC.
Tel: 800-399-2808
Fax: 818-887-0388
E-Mail: Safe@BH90210.com

#296 @ www.networkworld.com/infoxpress

For More Information on Advertising
in Network World's Marketplace
1-800-622-1108

LAN/WAN • BUY/SELL
FULLY WARRANTEED
NEW/REFURBISHED
RENTAL
LEASE

MODEMS
DSU/CSU'S
T-1 EQUIPMENT
SWITCHES, MUXES
HUB, BRIDGES, ROUTERS, ETC.

Cabletron Bay Networks
CISCO SPECIALISTS
3Com Micom Adtran H/P
We carry all manufacturers, call ask for sales.

http://www.adcs-inc.com
PHONE
800-783-8979
FAX (916) 781-6962
ADCS INC.

#240 @ www.networkworld.com/infoxpress

Increase your company's exposure in *Network World's* MarketPlace with these bonus distribution issues.

Issue	Bonus Distribution
May 10	NetWorld+Interop, Las Vegas (May 11 13)
June 7	Supercomm, Atlanta (June 8 10)
June 21	PC Expo, New York City (June 21 24)

USED CISCO DIRECT
1-888-89-CISCO

NETFAST
Save up to 80% on new/used:
- Routers
- Switches
- XDSL
- T1 CSU/DSUs
- ATM
- Fast Ethernet
- ISDN
- Frame Relay

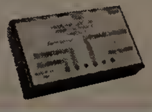
CISCO SYSTEMS
WE BUY USED

- CISCO
- Ascend
- Lucent/Livingston
- 3COM/USRobotics
- Nortel/Bay Networks
- Larscom
- Cabletron
- Paradyne
- Motorola
- ADC Kentrox
- Newbridge
- Digital Link
- Network Assoc.
- Xyplex
- Adtran
- Fore
- IBM

www.digitalwarehouse.com
DIGITAL WAREHOUSE
Your Information Superhighway Discount Source

tfast Communications Inc., 56-29 56th Drive, Maspeth, NY 11378 USA
one: 1-888-892-4726 or 718-894-7500 Fax: 718-894-1573

#259 @ www.networkworld.com/infoxpress



Solve
Ethernet
Distance
Made in U.S.A.
Limitations with Fiber! (800) 894-9694
(CONVERT: COPPER <-> FIBER)

DESCRIPTIONS:
10BASE-T - 10BASE-FL Converter*
AUI - 10BASE-FL Fiber Optic Transceiver
AUI - 10BASE-T Transceiver
100BASE-TX - 100BASE-FX Converter*
SM-MM Converters & Repeaters Available*
*20 Unit Rack Mount Available
Switches, Fiber & CAT 5 Products
www.fiberdyne.com

FIBERDYNE LABS, INC.
127 Business Park Dr., Frankfort, NY 13340
Tel. (315) 895-8470 Fax (315) 895-8436
FACTORY DIRECT SAVINGS

#291 @ www.networkworld.com/infoxpress

Cabletron Equipment
GUARANTEED

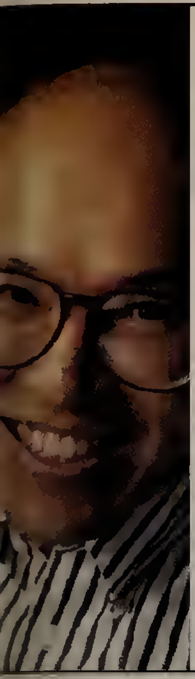
IN-STOCK OVER 20,000 UNITS READY TO SHIP

- 100% factory refurbished
- Only factory-authorized VAR
- 30 day hot swap, 1 year free repair
- We also carry: Bay Networks, 3Com, Compex, Cisco & more!

888-663-3313

VNETEK COMMUNICATIONS, LLC
Vnetek Communications, LLC
sales@vnetek.com • www.vnetek.com
Brand names are registered trademarks.

#260 @ www.networkworld.com/infoxpress



Bay Networks
The Merged Company of SynOptics and Wellfleet

CABLETRON SYSTEMS

Cisco Systems
3Com
Novell. Gold Partner
MADGE

We Stock the Largest Inventory of Refurbished Bay Networks in the World!

NLE
NATIONAL LAN EXCHANGE

- Bay Networks ESP Trained
- Bay Networks Authorized
- Full Product Line
- New & Used, Buy & Sell
- Proven Track Record
- Good As New Warranties
- Repair Services Available
- Technical Support

National LAN Exchange

888.891.4BAY (4229)

Phone 801-377-0074
Fax 801-377-0078
1403 W. 820 N. Provo, UT 84601

Visit us On the Web @ www.nle.com

VISA MasterCard DISCOVER AMERICAN EXPRESS C.O.D's Terms
Fast overnight delivery FedEx

#231 @ www.networkworld.com/infoxpress

NetworkWorld
Info press
Online Reader Service

For FREE Product Information

GO Online!

www.networkworld.com/infoxpress

TRAINING DIRECTORY

Certified NetAnalyst
(800) 645-8486
WWW.PINEMOUNTAINGROUP.COM
Protocol & Analyzer Training
Sniffer, Fluke, HP, Shomiti

Infotec
(800) 700-TRAIN
www.infotec.com/novell
Novell CNA, CNE, MCNE
Nationwide Network of Centers

Certizone
(913) 981-5028
www.certizone.com
MCSE Customized Training Pgms
Network Mgmt A+ Network+

NCR Customer Education
(800) 845-2273
www.ncr.com/trainus
Cisco, MCSE, NT & Networking, Training

CrossTec's NetOp School SW
(800) 675-0729
www.CrossTec.Net
Six essential tools for the networked classroom. Download a Free Eval

SecureIT
(888) 777-4313
www.secureit.com
Test Your Security Knowledge!
Certified Security Training.

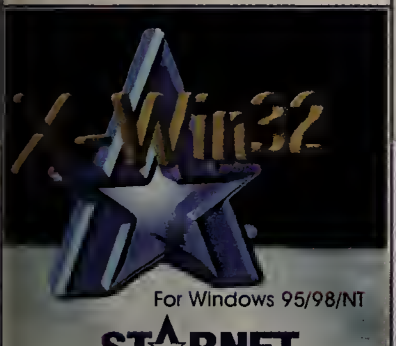
ForeFront Direct
(800) 475-5831
www.ffg.com
Computer based training for the I.T. industry

Transcender Corporation
(615) 726-8779
www.transcender.com
MCSE, MCSD, MCP Exam Simulations

Contact these companies today to help you with your training needs!

#257 @ www.networkworld.com/infoxpress

Bringing Unix to Windows Desktops



For Windows 95/98/NT

STARNET COMMUNICATIONS

Visit us at www.starnet.com

Download Free Demo from:
ftp://ftp.starnet.com/files/mb02/x-win411.exe

LBX Support
Access Security
Multiple Monitors
Mouse Wheel Support
Cut/Paste to Windows Apps

$175.00

#329 @ www.networkworld.com/infoxpress

Clean up your world.

Built to order rack mount solutions.

Redundant Servers and RAID Subsystems.

Call us, we do the dirty work.

800-480-4384

Rackmaster Systems, Inc.

#266 @ www.networkworld.com/infoxpress

USED
NETWORK HARDWARE
"Over 15 Years of Exceptional Service"

ROUTERS • HUBS • DSU/CSU
SWITCHES • TERMINAL SERVERS

BUY/SELL/LEASE

CISCO

ASCEND • LIVINGSTON
ADTRAN • KENTROX

Overnight Delivery: Fully Guaranteed

800-230-6638

VISA 805-964-1314 Fax: 805-964-5649

www.networkhardware.com

NETWORK HARDWARE RESALE, INC.

#244 @ www.networkworld.com/infoxpress

BUY, SELL OR ANNOUNCE

Network Products and Services with
Network World's Marketplace
Call 800-622-1108 ext. 7507

4LANWAN.COM

Purveyors of Networking Hardware

NEW & USED
Switches, Modules, Routers, Hubs & More

Cisco Systems
Proteon
SynOptics
SMC
3Com
WORLD'S LARGEST SUPPLIER
NEW / USED 3 COM PARTS
US Robotics
Bay Networks
CABLETRON SYSTEMS
intel
CHIPCOM

BUY & SELL
Quantity, Reseller, Government & Education, Discounts available.

LOWER PRICES THAN THOSE WAREHOUSE GUYS!

- Lowest Prices on Factory Fresh Equipment
- Up to 90% OFF Retail for Refurbished Items
- Huge Inventory of Legacy Products
- Factory Trained Consultants on Staff
- Authorized Service Center
- We Also Do Repairs & Exchanges
- Same Day Shipping on Most Items
- Same Day Delivery Via Counter Service

HUGE DISCOUNTS

GIANT INVENTORY

Fax us Your Want to Sell / Buy Lists @ 516-293-5325

Visit our Web Site with On-Line Shopping & Auction @ WWW.4LANWAN.COM
A Division of Ergonomic Enterprises, Inc.

ONE YEAR WARRANTY ON ALL USED EQUIPMENT

CALL TOLL FREE: 1-877-4LANWAN

International Calls: 001-1-516-293-5200 / E-mail: Sales@4LANWAN.COM

VISA C.O.D. Net Terms

WWW.4LANWAN.COM, Inc.
A Division of Ergonomic Enterprises, Inc.
47 WERMAN CT. PLAINVIEW, NY 11803

logos are registered trademarks of the companies they represent

QUALITY OUR 16th YEAR

#271 @ www.networkworld.com/infoxpress

Livingston
Ascend
US Robotics
Micom

CISCO, BAY NETWORKS, CABLETRON, SYNOPTICS,

Specialist in all Cisco products including Memory

LAN/WAN Products

New, Used, Lease, Rent

3Com
Adtran
Motorola
Codex
Xylogics
Wellfleet

We carry all Manufacturers

Millennium Solutions Group, Inc.

- Routers, Bridges
- DSU/CSU's
- Switches, ATM
- Frame Relay
- Hubs, Modems
- Voice over Data

We Buy and Sell
888-801-2001 Fax (916) 630-2000
Visit our Web Site at:
http://www.millenniumsolutions.net

#293 @ www.networkworld.com/infoxpress

Category 5

Premium Patch Cords

Our Patch Cords exceed the EIA/TIA 568a specification.

- Contacts: 50m gold platin
- Wire: 24 Awg. stranded, Category 5
- Stranded wire is very flexible
- Molded strain reliefs available
- Available in Black, Ivory, White, Red, Gree, Blue, Yellow, Gray, Hot Pink, Orange & Purple

3 ft	1.45
6 ft	1.90
10 ft	2.50
15 ft	3.25
25 ft	4.75

In Lots of 5
11 Colors Available

Bulk Wire

CAT 5 pvc	AS LOW AS	$65.00
CAT 5 plenum	AS LOW AS	$190.00
19" Data Rack		$126.00

CAT 5 Patch Panels

12 PORT Mini	$55
24 PORT	$85
48 PORT	$170
96 PORT	$330

All Patch Panels are UL & EIA/TIA Verified

Outlets

CAT 5 Inserts	3.20 ea
Faceplate	1.00 ea

Fiber Optic Cords

5T-ST Duplex 62.5/125	$23.00

ELECTRO PRODUCTS • Call 1-800-423-0646
Or fax your request to (253) 859-9101

#255 @ www.networkworld.com/infoxpress

Network World, Inc.

Colin Ungaro, President/CEO
Evilee Thibeault, Senior Vice President/Publisher
Mary Kaye Newton, Assistant to the President
Eleni Brisbois, Senior Sales Associate

FINANCE

Mary Fanning, Vice President Finance
Paul Mercer, Finance Manager

HUMAN RESOURCES/AOMINISTRATION

Monica Brunaccini, VP of Human Resources/Admin.
Danielle Caldwell, Sr. Human Resources Representative
Frank Coelho, Office Services Manager
Lisa Smith, Telecommunications/HR Coordinator
Tom Garvey, Mailroom Supervisor
Mark Anderson, Mailroom Assistant

MARKETING

Hillary Freeley, Director of Marketing
Jim Grisanzio, Public Relations Manager
Kristin Wattu, Marketing Communications Manager
Barbara Sullivan, Sr. Marketing Research Analyst
Oonna Kirkey, Marketing Design Manager
Judy Schultz, Graphic Oesigner/Marketing Specialist
Cindy Panzera, Marketing Specialist

GLOBAL PROOUCT SUPPORT CENTER

Nancy Parquette, Event Planner

AOVERTISING OPERATIONS

Karen Lincoln, Director of Advertising Operations
Ann Jordan, Supervisor of Advertising Operations
Maro Eremyan, Advertising Coordinator
Kris Guay, Direct Response/Recruitment Ad Coordinator

PROOUCTION

Ann Finn, Production Director
Greg Morgan, Senior Production Supervisor
Marlo Matoske, Print Buying Supervisor

CIRCULATION

Sharon Smith, Senior Oirector of Circulation
Richard Priante, Oirector of Circulation
Christine Rhoder, Circulation Marketing Manager
Bobbie Cruse, Subscriptions Manager
Mary McIntire, Circulation Coordinator

RESEARCH

Ann MacKay, Research Director

OISTRIBUTION

Bob Wescott, Oistribution Manager/(508)879-0700

IOG LIST RENTAL SERVICES

Elizabeth Tyle, Sales Representative
P.O. Box 9151, Framingham, MA 01701-9151
(800) 343-6474/(508) 370-0825, FAX:(508) 370-0020

PROFESSIONAL OEVELOPMENT GROUP

William Reinstein, Senior V.P./Business Oevelopment
Steven Engel, General Manager Seminars & Events
Andrea D'Amato, Sales Manager/Strategic Partnerships
Debra Becker, Senior Marketing Manager
Christie Combs, Finance/Operations Manager
Peter Halliday, Product Manager/NetOraw
William Bernardi, Senior Event Planner
Maureen Whiting, Senior Marketing Specialist
Kristin Ballou, Account Executive
Betty Amaro, Finance/Operations Analyst
Jill Keaveney, Event Planner
Tim DeMeo, Customer Service Representative
Tricia Fiscale, Sales Assistant

ONLINE SERVICES

Ann Roskey, Director, Online Services
Jean-Olivier Holingue, Oirector of Technology
Clare O'Brien, Online Sales Manager
Dan Chupka, Online Account Executive
Pam Kerensky, Online Oatabase Manager
Andrea Duksta, Senior Web Producer
Karen Avedian, Sales Operations Analyst
Jolene Springfield, Sales Operations Analyst
Christine Rhoder, Circulation Marketing Manager
Nadar Fakhraie, Web Engineer
FAX:(508) 270-8869

INFORMATION SYSTEMS/IMAGING SERVICES

Michael Oraper, Vice President Information Systems
Rocco Bortone, Network Manager
Kevin O'Keefe, Systems Manager
John Chambers, Groupware Technologist
Anne Nickinello, Senior Manager, Imaging Services
Oeborah Vozikis, Senior Imaging Specialist
Sean Landry, Imaging Specialist

IDG

Patrick J. McGovern, Chairman of the Board
Kelly Conlin, President
Jim Casella, Chief Operating Officer

Network World is a publication of IOG, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. IOG publishes over 275 computer publications in 75 countries. Ninety million people read one or more IDG publications each month. *Network World* contributes to the IOG News Service, offering the latest on domestic and international computer news.

Network World Technical Seminars are one and two day, intensive seminars in cities nationwide covering the latest networking technologies. All of our seminars are also available for customized on site training. For complete and immediate information on our current seminar offerings, call a seminar representative at 800 643 4668, or go to www.nwfusion.com/saminars

NetworkWorld

EDITORIAL INDEX

A
AbirNet 85
Akamai Technologies 73
America Online 10
Antara 7
Aptex Software 85
ArrowPoint Communications 85
AT&T 7,10
B
Bell Atlantic 31
BellSouth 31
Bluestone Software 74
Bright Tiger 85
C
CACI Products 35
Candle 35
Chaparral Technologies 19
Check Point Software 48
Cisco 111
Compaq 14
Computer Associates 8
Compuware 7
ControlNet 7
Covad Communications 75
D
Data General 19
Delano Technology 111
Deutsche Telekom 16
E
Exodus Communications 54
Extreme Networks 8
F
Foundry Networks 76
I
IBM 38
Inktomi 76
Intel 12
Iridium 8
L
Level 3 Communications 8
Lucent 8
M
Maker Communications 16
Manage.Com 76
MediaOne 7
Microsoft 10
N
NetSpeed 86
Network Alchemy 78
Nextlink Communications 78
NextPoint Networks 85
Nortel Networks 7
O
Office.com 8
P
Peoples Choice TV 31
Q
Qwest 31,52
R
Red Hat Software 78
S
Secure Computing 35
Sitara Networks 85
Sprint 16,31
Stampede Technologies 35
Switched Network 86
T
Telecom Italia 16
TeleVideo 19
Torrent Networking 86
Transition Networks 19
U
Ukiah Software 78
V
Verio 10
W
WinStar Communications 54
Y
YAGO Systems 86

ADVERTISER INDEX

Advertiser	Reader Service#	Page#	URL
AOC Kentrox Industries	52	23	www.kentrox.com
American Power Conversion	67	74-75	www.apcc.com
American Technology	302	104	www.atli.com
AT & T		11	www.att.com
8ay Tech	262	100	www.baytechdcd.com
8orderware Technologies Inc	53	28	www.borderware.com
Cable & Wireless	68	84	www.cwusa.com
Castle Rock Computing	252	104	www.castlerock.com
Check Point		70, 71	www.checkpoint.com
Check Point, Meta IP Group	76	49	www.metaip.checkpoint.com
CICAT Networks	303	100	www.telcoexpress.com
Compaq Computer Corp		30	www.compaq.com
Compatihle Systems Corp	54	32	www.compatible.com
Computer Associates	55	17	www.cai.com
Cybex Computer Products	227	102	www.cybex.com
Oigital Link Corp	70	86	www.dl.com
E Spire Communications	71	80	www.espire.net
Eastem Research	225	103	www.erinc.com
E-Comms Inc	327	102	www.e-comms.com
Edimax Computer	328	106	www.edimax.com
Elron Software	56	27	www.elronsoftware.com
Evans Consoles	324	105	www.econsole.com
Excel Computer	217	108	www.excelcdrom.com
Extreme Networks	57	15	www.extremenetworks.com
Fore Systems	58	58-59	www.fore.com
ForeFront Oirect Inc	237	107	www.ffg.com
Foundry Networks	59	24-25	www.foundrynet.com
*Genicom Corp	105	39	www.compeq.com
Global Technology	292	104	www.gnatbox.com
Great Lakes Case & Cabinets	274	106	www.greatcabinets.com
Hewlett Packard		113	www.hp.com
I8M		2-3, 19, GATE	www.ibm.com
Intel Corp		13	www.intel.com
Interlink Computer Sciences	316	101	www.interlink.com
Intemational Network Systems	104	57	www.ins.com
Intemet Dynemics Inc	326	98	www.intemetdynamics.com
Intemet Security Systems	73	87	www.iss.net/salesuite
Kansmen Corp	298	106	www.kansmen.com
Lancast	106	38	www.lancast.com
Lantronix	74	51	www.lantronix.com
Lastar Datacomm Solutions	315	104	www.lestar.net
Mariposa Technology	60	6	www.mariposatech.com
MCI/Worldcom	75	52-53	www.mciworldcom.com
Microsoft Corp		20-21, 46-47	www.microsoft.com
Mission Critical Software		79	www.missioncritical.com
Network Associates	77	42	www.networkassocietes.com
Network Instruments	290	106	www.networkinstruments.com
Nortel Networks	78	72	www.nortelnetworks.com
Okidata	79	77	www.okidata.com
Olicom	61	33	www.olicom
QMS Inc	62	26	www.qms.com
Qwest Intemet	99	92	www.qwest.com
Racal Security & Payments	63	36	www.racal.com
RAO Oata Communications	100	90	www.rad.com
Rainbow Technologies	108	68	www.rainbow.com
Raritan Computer	314	98	www.raritan.com
Ripple Technologies	101	91	www.ripple.com
Rose Electronics	289	99	www.rosel.com
Savin Corp	64	4	www.savin.com
SOL Comm Inc	277	100	www.sdlcomm.com
Seagate Software	65	37	www.seegatesoftware.com
Timeplex Group	239	102	www.timeplex.com
Unisys Corp		55	www.unisys.com
UUNET		50	www.uu.net
Visual Networks Inc	66	9	www.visualnetworks.com
V-SPAN,Inc.	218	107	www.vspan.com
Westem Telematic Inc	250	105	www.wti.com
Xircom	109	81	www. xircom.com

Network World Fusion – www.nwfusion.com

3COM
3M-Telecom Systems Division/Volition
ADC Kentrox
Adaptec, Inc.
Allot Communications
Ascend Communications
AXENT Technologies
Cisco Systems
Compaq
Compatible Systems Corporation
Dell Computer Corporation
F5 Labs
Foundry Networks, Inc.
Intraware
I8M
Larscom Incorporated
Make Systems
MCI
NetSolve
Nortel
Ripple Technology
Shiva
Sterling Software
VariSign
Visual Natworks
Wavespan
WinNet MCS
Xircom

These indexes are provided as a reeder service. Although every effort has been made to make them as complete as possible, the publication does not essume liability for errors or omissions.

*Indicates Regional/Demographic

Sales Offices

Carol Lasker, Associate Publisher
Internet: clasker@nww.com
Debbie Lovell, Senior Sales Associate
(508) 875-6400/FAX:(508)879-5760

NEW YDRK/NEW JERSEY

Tom Davis, Advertising Director/Eastern Region
Elisa Della Rocco, District Manager
Internet: tdavis, elisas@nww.com
Aimee Jacobs, Sales Assistant
(201) 587-0090/FAX: (201) 712-9786

NDRTHEAST

Donna Pomponi, Senior District Meneger
Kevin Gasper, District Manager
Michael Eadie, Account Executive
Internet: dpomponi, kgasper, meadie@nww.com
Linda Bishop, Sales Assistant
(508) 875-6400/FAX: (508) 879-5760

MID-ATLANTIC

Jacqui DiBianca, Senior District Manager
James Kalbach, Account Executiva
Internet: jdibian, jkalbach@nww.com
Rebecca Showers, Sales Assistent
(610) 971-1530/FAX: (610) 975-0837

MIDWEST/MARYLAND

Eric Danetz, District Maneger
Aimee Jacobs, Sales Assistant
(201) 587-0090/FAX: (201) 712-9786

CENTRAL

Dan Gentile, Midwest Regional Manager
Internet: dgentile@nww.com
Kristin Ashton, Sales Assistant
(512) 249-2200/FAX: (512) 249-2202

NDRTHWEST

Sandra Kupiec, Advertising Director/Western Region
Carol Stiglic, Senior District Manager
Susan Rastellini, Sr. District Manager
Karen Weiss, Sr. District Manager
Lara Greenberg, District Manager
Internet: skupiec, cstiglic, slr, kweiss,
lgreenbe,kmarceau@nww.com
Ketherine Marceau, Sales Operations Maneger
Javiera Garcia, Sales Assistant
Mark Hiatt, Sales Assistant
(408) 567-4150/FAX: (408) 567-4166

SDUTHWEST

Amy C. Bartulis, Senior District Manager
Internet: abartuli@nww.com
Becky Bogart, Account Executive
(949) 250-3006/FAX: (949) 833-2857

SDUTHEAST

Don Seay, Senior District Manager
Internet: dseay@nww.com
Terry Sanders-Prentice, Sales Assistant

DIRECT RESPONSE ADVERTISING
Response Card Decks/Marketplace

Kim Norton, Director of Direct Response
Richard Black, Sr. Account Manager
Enku Gubaie, Account Manager
Sean Weglage, Account Manager
Kathryn Zinn, Account Manager
Internet: knorton, rblack, egubaie, sweglage, kzinn@nww.com
Sharon Chin, Sales/Marketing Operations Manager
Chris Gibney, Sales Assistant
(508) 875-6400/FAX: (508) 628-3976

RECRUITMENT ADVERTISING

Dodi Rabinovitz, Senior Recruitment Director
Carla Cappucci, Marketing/Sales Coordinator
Sandy Weill, Account Executive
Karima Zannotti, Account Executive
Internet: drabinov, ccapp, sweill, kzannott@nww.com
(508) 875-6400/FAX: (508) 820-0607

Publicize your press coverage in *Network World* by ordering reprints of your editorial mentions. Reprints make great marketing materials and are available in quantities of 500 and up. To order, contact Reprint Management Services at 717-560-2001 ext. 24 or 147 West Airport Road, Lancaster, PA 17606-5363.

Start-up aims to power e-mail apps into overdrive

Delano Technology's E-mail Application Server promises to help users build more advanced messaging systems.

BY PAUL MCNAMARA

RICHMOND HILL, ONTARIO — Companies will soon be able to get more bang from their current messaging networks by adding Delano Technology's E-mail Application Server, which automates electronic interactions between customers and partners.

Delano was co-founded last year by Tony Davis, the creator of WinFax and former Lanacom CEO and Bahman Koohestani, former head of the messaging products division at Netscape.

Beta testers and industry analysts say the fledgling company's server, which includes a component-based, graphical user interface-equipped application builder, will help organizations deploy more sophisticated and scalable e-mail applications without extensive custom programming.

Applications that can be built with and deployed on the server include customer support, resume response, outbound marketing, product upgrade notifications and cross-selling campaigns.

Ease of drag and drop

"E-mail Application Server is empowering people to do applications that they haven't been able to do easily — if at all," Davis says.The product's application builder allows users to create event-driven or time-driven e-mail workflows using a series of drag-and-drop icons.

One beta customer has high hopes for E-mail Application Server, which runs on Windows NT and works in conjunction with a company's existing standards-based messaging systems, directories and databases.

"The direction that they've got is clearly the right one," says Mike Larkin, vice president of sales at the Advantage Business Market division of Bell Canada.

Potential money-saver

Larkin's operation oversees 10,000 business-to-business accounts and wants to use E-mail Application Server to automate and manage renewals of those contracts.

"If we could convert a lot of those to electronic renewals, it represents a significant cost savings for our business and allows our salespeople to focus on higher-end opportunities," he says.

Ease of use will be Delano's calling card, according to David Strom, a messaging consultant based in Port Washington, N.Y.

"Delano has a very flexible tool kit that allows people to assemble their own autoresponders and interactive e-mail applications," Strom says. "You could build them yourself in Perl [scripting language] or whatever, but Delano's concept is to enable people to do so without as much programming expertise and to make [the applications] into a series of building blocks."

While impressed with the technology, Strom believes Delano may have trouble getting customers to recognize the value of an e-mail application server.

Delano founder Tony Davis wants to help users build more sophisticated e-mail applications.

"The biggest barrier [for the company] is just explaining what the heck the product does and how it differs from simple mail responders," Strom says. "With Delano, you have much more control over message filtering, and actions besides replying, such as kicking off particular programs to handle tasks" based on the content of an e-mail.

Davis, who is Delano's chief technology officer, recognizes that his company has "a challenge" ahead in terms of explaining the function of an e-mail application server, a phrase the company coined.

"When you buy our system, you at this moment don't get a functioning in-bound e-mail management system, what you get is the ability to create one," Davis says.

Scheduled to be released May 10, pricing for E-mail Application Server is based on usage volume and starts at $5,000 for up to 500,000 e-mail or Web-form interactions per year.

Delano received $3 million in seed funding earlier this year from XDL Capital, a private investment fund, and individual investors.

Delano: (877) 264-8881

Cisco wants to help host your applications

BY JIM DUFFY

SAN JOSE — Cisco's application outsourcing plan could let small and mid-size businesses reap the benefits of software packages previously only affordable by larger companies.

Cisco last week unveiled the Hosted Application Initiative, an effort to ally with software developers and service providers to make business applications accessible over the Internet and IP virtual private networks.

Cisco believes its products can help service providers offer users more potent application hosting services.

By outsourcing application hosting, small businesses can save money by not having to buy the software and hire staff the to maintain the software. In addition, users don't need to buy the servers and network equipment on which the application runs.

Outsourcing application hosting has allowed a New York online information resource for food-service professionals, Foodservice.com, to run an Oracle database application it could not previously afford.

"We were looking at $500,000 worth of equipment just to launch something on Sun's Solaris platform," says Karin Wertheim, CEO of Foodservice.com. "And you're talking between $15,000 and $100,000 just for your Oracle license."

Outsourcing application hosting is saving Foodservice.com "thousands" per month, Wertheim says. Service provider Breakaway Solutions of Boston is operating Foodservice.com's applications, databases and servers.

"For smaller businesses, outsourcing means you don't need the internal infrastructure of having to troubleshoot servers and install software," says Leslie Murdock, president of Murdock & Associates, a 65-employee accounting firm in Santa Clara, Calif. "That's what I find compelling. I don't need an IS person here."

For Cisco, hosted applications serve as a vehicle to sell more hardware and IOS software to service providers as the underlying infrastructure for delivering application services.

With that, Cisco says it will operate a hosted application lab in which the company can create and demonstrate a hosted application delivery architecture. From there, Cisco will test and benchmark this architecture with a variety of business applications.

Cisco says it will also work with software vendors to network-enable their applications.

The firm will also add features, as needed, to Cisco IOS software and hardware platforms to maximize hosted application performance.

Cisco will also invest in software companies and technology for financial management, electronic commerce, procurement, human resources and enterprise resource planning.

The challenge for Cisco and the software and application service providers in this market is to deliver on service-level guarantees and to maintain application availability and network reliability.

Foodservice.com's Wertheim notes that the drawback to outsourcing application hosting is that the user is leaving the availability of their business' mission-critical applications in the hands of a third party.

"Hopefully, you're dealing with experts, and they can do a much better job than you can," Murdock says.

Network World, 161 Worcester Road, Framingham, Mass. 01701-9172, (508) 875-6400

Periodicals postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385662. *Network World* (ISSN 0887-7661) is published weekly, except for a single combined issue for the last week in December and the first week in January by *Network World*, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

Network World is distributed free of charge in the U.S. to qualified management or professionals.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on the information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Nonqualified subscribers: $5.00 a copy; U.S. - $129 a year (except Washington, DC,$136.74); Canada - $160.50 (including 7% GST, GST#126659952); Central & South America - $150 a year (surface mail); Europe - $205 a year (surface mail), all other countries - $300 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

Please include mailing label from front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor,Mich. 48106.

PHOTOCOPYRIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by *Network World*, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus 50 cents per page is paid to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to *Network World*, P.O. Box 3090, Northbrook, IL 60065.

BPA INTERNATIONAL

RED TAG

Copyright 1999 by *Network World*, Inc. All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission.

Reprints (minimum 500 copies) and permission to reprint may be purchased from Reprint Management Services, 147 West Airport Road, Lancaster, PA 17606-5363, (717) 560-2001.

USPS735-730

Network World's

NetWorld+Interop 99 Planning Guide

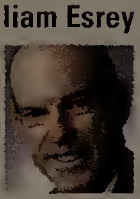
NetWorld+Interop is one of the best trade shows for network professionals who are involved in planning, deploying and managing enterprise nets.

This year's show — which will take place May 10-14 at the Las Vegas Convention Center — features a large number of programs and meetings, so we've prepared this guide to help you through the week and make sure you spend your time wisely.

Picks of the Week

Keynote: Sprint Chairman and CEO William Esrey

Tuesday, 9 a.m. to 10 a.m.



Esrey, the leader of one of the world's largest telecommunications companies, will give his views on the future of the networked world.

Keynote: Cisco CEO John Chambers and Chief Technology Officer Judith Estrin

Wednesday, 9 a.m. to 10 a.m.

This dynamic duo will talk about the technologies that will make the Internet as ubiquitous as the telephone network.

ED CALDWELL (L) AND JASON GROW

Highlights

Monday, May 10

1 p.m. to 2:15 p.m.

NEXT GENERATION IP TELCO SERVICE

A new wave of service providers is using wave-division multiplexing equipment to boost network bandwidth. Others are building voice/data points of presence for their network backbones. This seminar focuses on how much IP telco services cost and what's available. The session will be led by Dennis Jennings, general manager of Broadband Networks at Bellcore, and will include comments from G. Ray Ritchie, principal, Engineering and Professional Services at Bellcore, and Carl Ford, managing director of community development at pulver.com.

Tuesday, May 11

10:15 a.m. to 11:45 a.m.

WHAT TO LOOK OUT FOR WHEN IMPLEMENTING SANS

The adoption of storage-area networks (SAN) has been restricted by a lack of interoperability and integration. This session will focus on companies that have installed SANs, how they did it and the problems they had. The moderator for this session will be Doug Fierro, manager of network solutions for EMC. Panelists will include Jeff Vogel, vice president of marketing and business development at McDATA, and Kevin Collins, project manager of SAN management at Hewlett-Packard.

2 p.m. to 3:30 p.m.

VOICE OVER FRAME RELAY

What do you know about this state-of-the-art technology? In this session, learn whether voice over frame relay will become passé when voice-over-IP installations spread, whether voice over frame relay is economical and how its quality stacks up against that of traditional telephony and voice circuits. Presenting their views will be William Flanagan, program director for the NetReference consultancy; Dave Bushick, senior product manager for Hughes Network Systems; William Witowsky, senior vice president and chief technology officer for Telogy Networks; Larry Greenstein, director of product management for Nuera Communications; and Steve Baechle, vice president of technology consulting for Hypercom Network Systems.

4 p.m. to 5:30 p.m.

DIRECTORIES AND NETWORKS: MADE FOR EACH OTHER

Jamie Burton, president of the Burton Group, shows why directories should be the central focus of today's enterprise networks. From Lightweight Directory Access Protocol to Common Information Model, Burton discusses how the directory is key in defining network security and quality-of-service policies.

Wednesday, May 12

10:15 a.m. to 11:45 a.m.

ISSUES IN DEPLOYING WEB CACHING SERVICES

What do you need to know about caching data to provide faster Web browsing? Explore the alternatives, examine their drawbacks and avoid problems with caching appliances in this session presented by Intermedia and Vayu Communications.

2 p.m. to 3:30 p.m.

THE FUTURE OF NT . . . OR WINDOWS 2000: IN PERSPECTIVE

Although Windows 2000 is still somewhere on the horizon, you need to make decisions about it here and now. Mark Minasi, chief scientist at Minasi Research and Development, whom some attendees have dubbed the "Robin Williams of Technology," makes the Windows 2000 direction clear. He looks at what the next version of NT fixes and what it doesn't.

3:30 p.m. to 5:30 p.m.

ROUTING AND QOS IMPROVEMENTS

Improving your routing performance has so far focused on speed and route recalculation. With the growing importance of getting the most out of your investments, you need to look at some of the enhanced routing protocols available, network analysis and quality-of-service routing. Adopting low-latency routing and the efficient use of bandwidth are two of the main points of this session.

Thursday, May 13

10:15 a.m. to 11:45 a.m.

INTEGRATING WEB-BASED ENTERPRISE MANAGEMENT (WBEM) TECHNOLOGIES

Intel, Tivoli and Cisco team up to tell you why WBEM, Common Information Model and XML help network executives manage their desktops, implement virtual private networks and view network resources. Come hear the views of Jim Turner, senior manager of network management partnerships for Cisco; L.D. Weller, a member of Intel's Platform Manageability Planning group; and Raymond Williams, director of standards for Tivoli.

NetworkWorld NET BOWL 99

NetBowl 99

***Wednesday,** 6 p.m.,*
Las Vegas Hilton

Join moderator John Gallant, editor in chief of *Network World*, for a competition that will have networking's brightest proving their knowledge of network and industry trivia. In this battle, it's an East Coast team that includes Howard Anderson, founder and president of The Yankee Group, and Karen Mashima, vice president of Lucent's Data Networking Systems, vs. a West Coast team that includes Larry Lang, vice president of service provider marketing for Cisco, and Janice Roberts, senior vice president of Global Marketing and Business Development for 3Com. Proceeds from NetBowl 99 go to NetDay, a group that is wiring K-12 schools for the 'Net.

Monday, May 10, VPN Day

Virtual private networks (VPN) are cropping up everywhere. However, you may still be confused about deployment or whether your company really needs a VPN. VPN Day is designed to answer all your questions about VPN security, quality of service and implementation. VPN Day will showcase LAN-to-LAN access, demonstrate IP Security, highlight secure extranets and review cryptography. The session will be led by network and security experts David Piscitello and Lisa Phifer of Core Competence, and Fred Avolio of Avolio Consulting. The event runs from 9 a.m. to 5 p.m. and costs $495.

Network World's Operating Systems Showdown

NetworkWorld SHOWDOWN Operating Systems

Have you ever wanted to see executives from Microsoft, Novell, Sun, The Santa Cruz Operation (SCO) and Red Hat Software rumble? Well, your wishes will come true as representatives from each of these top vendors participate in a presidential-style debate. PowerPoint presentations and marketing fluff are not permitted.

Not only will vendor executives be grilling each other, they'll also face questions from a panel of industry experts including Christine Burns, *Network World* Test Alliance director, and Nick Petreley, editorial director for *Linux World*.

When: Tuesday, May 11, 10:30 a.m. to noon
Where: Las Vegas Convention Center, Room N246

Combatants:
Tanya van Dam, group product manager for Windows NT Server, Microsoft
Drew Major, chief scientist, Novell
Richard Green, vice president of the Solaris product line, Sun
Tamar Newberger, director of server product marketing, SCO
Erik Troan, director of engineering, Red Hat

Moderator:
John Gallant, editor in chief, *Network World*

HEWLETT®
PACKARD

If your IT Management solution fails,
which thank-you gift will the boss be sending you?

The word is out. Far too many enterprise management projects don't deliver. So, what's the hang up? Recent industry analyst studies reveal that most major framework implementations take too much time and don't deliver ROI. After years of work, only a small portion of purchased functionality is actually implemented. There is a better way.

HP OpenView delivers measurable, proven results quickly and completely. A new independent head-to-head lab test* revealed "*HP delivers on the promise of integrated tools to solve specific problems... Unlike PLATINUM, CA and Tivoli, HP has not overloaded its solution with a common framework... HP's generally flawless solution sets the mark against which to measure all other out-of-the-box functionality*".

The OpenView approach is different from the "leap of faith" framework approach. Target your most pressing problem and solve it today.

HP OpenView. Reach your management goals without getting hung in the process.

HP OPENVIEW

Works | Right | Now

LEARN WHY OPENVIEW HAS SO MANY SATISFIED CUSTOMERS:
HTTP://WWW.OPENVIEW.HP.COM
OR CALL 1·800·785·3925

HP OPENVIEW Open TECH SERIES

To Register for the OpenTech Series near you call **800-258-6236** or
Visit our Website at **openview.hp.com/opentech.html**

Networld + Interop
May 11-13 Las Vegas Booth #7553

*Source: Network Computing, Syracuse University Real-World Labs®, 1998.

Backspin

Virtualizing business

Virtualizing is one of the most important issues of the Internet era. Indeed, the idea has become a Hollywood staple: Just consider *The Lawnmower Man*, the awful adaptation of *Johnny Mnemonic*, and the latest blockbuster, *The Matrix*. This translation of science fact into science fiction makes virtualization as part of everyday life seem to be just around the corner.

<digression>I saw *The Matrix* with my brother-in-law last week, and it's definitely worth seeing. Long (144 minutes), fast moving and visually stunning, the film has a lot to recommend it. On the other hand, there's some awful dialogue that the directors should have axed. I would have preferred to see a more talented actor in the lead role — Keanu Reeves is a dull, white-bread kind of actor, as I have noted in previous columns — and the plot has significant weak spots. If you're interested in why I think the plot was weak, drop me a note at noise@gibbs.com with the subject "Matrix."</digression>

MARK GIBBS

But in the business world, things are much more complex. It is not always easy to translate our business services and functions so they make sense online.

Consider newspapers: The real-world version of a newspaper is made up of the text and graphic content expressed in ink smeared on crushed dead trees. The online version is the same content wrapped in data structures (HTML) and smeared on a display.

From this example, we see that the part of the product that is constant and portable when we virtualize it is the content, while the delivery mechanism is the variable. But that's not all there is to virtualizing a product — there are a lot of other dimensions of real-world business to consider.

In particular, the process of making a buying decision can be very different online. While this process is easily virtualized for products such as newspapers and CDs, selling clothing, for instance, is a completely different proposition.

In the real world, you go to the store, you look at clothes on mannequins, feel the materials, compare colors and indulge in all the sensory stimuli. Quite obviously this is a different ball o' wax online.

Until recently, the experience of online shopping for clothes was not much different from shopping from a catalog, but Land's End (www.landsend.com) has very cleverly added a whole new dimension to the process.

On the Land's End site you can go to "My Model" and define a virtual model with your general physical characteristics (narrow, regular or broad shoulders, for example) and a picture of what appears to be a computer-rendered mannequin is displayed.

But this only works for women. Land's End hasn't done the same for men, teens or children yet, and, to my surprise, doesn't say up front that the My Model service is for women only or note when the rest of us will be represented.

But if you are a woman, once you've defined your body type you can select clothes, place them in a virtual dressing room, go to the dressing room and see them modeled. Very cool.

I'm not sure why the intermediate step of the dressing room is needed rather than offering, say, a "model this" button. Land's End also offers a tailored shirt selector that uses a Java applet to provide a hierarchical style selector with virtual fabric swatches. When you've made all of your choices you are shown a picture of the final shirt — also very cool.

This is the first time I've seen these things done quite so well. Of course, we could ask for more. For example, how about giving your actual measurements and a photograph of yourself so you can see what you'd really look like? How about having the virtual model rotate? What about having the model walk and sit?

And you know what? We don't have to ask, these things will happen soon enough. After all, one thing that virtualizes extremely well is competitive pressure.

Actualities to nwcolumn@gibbs.com or (800) 622-1108, Ext. 7504.

'NET BUZZ

PAUL MCNAMARA

So all those Internet stock speculators finally experienced their "warning" heart attacks last week. Only the true idiots among them could have been surprised to be clutching their chests.

NASDAQ's subsequent recovery should have returned the color to their cheeks. But if that didn't do the trick, Dr. Buzz offers this free prescription: Take a look at these two Web sites and call your broker in the morning.

HeyIdiot.com purports to be the site for a start-up of the same name. In fact, HeyIdiot.com is a parody and the brainchild of a trio of real entrepreneurs: **Dave Roux** and **Mitchell Kertzman,** respectively chairman and CEO of Network Computer, and, that Popeye the Sailor Man of databases, Oracle CEO **Larry Ellison.**

"HeyIdiot.com is focused on selling just one product," promises the home page. "That product is the stock of HeyIdiot.com. . . . You can buy as much stock as you want with the only rule being that each new purchase must be executed at a successively higher price."

Kertzman calls coining the name HeyIdiot.com "not quite what I was imagining for the pinnacle of a 30-year career in software," but he otherwise readily accepts the credit.

"As we at HeyIdiot.com believe, if you create a business without products, customers or employees, you eliminate most of the distractions that frequently plague the managements of companies that are more real," Kertzman says. "This has given us the ability to focus on the important stuff, namely the stock price."

Kertzman is also on the board of directors at another Internet start-up parody, **eTattler.com,** which is a wholly disowned subsidiary of the *San Jose Mercury News* and its technology columnist, **Dan Gillmor.** Borrowing a page from the eBay playbook, eTattler is an online auction house for buyers and sellers of gossip about celebrities, politicians and business leaders.

What do I hear for this juicy tidbit about Ellison and some skinny dame named Olive?

"Portal frenzy is everywhere, which is kind of leading to portal angst," says Drew Banks, an intranet guru at Silicon Graphics, Inc. SGI's intranet, called Junction, has been keeping such angst in check at the computer maker since 1993, or, in other words, since long before the word portal meant anything in geek-speak.

Banks and his colleague, Kim Daus, delivered an entertaining hour's worth of intranet "lessons learned" recently at Spring Internet World '99 in Los Angeles. You can check out their presentation and get a taste of Junction at **http://reality.sgi.com/shawnw_corp.**

Two of their tips struck these ears as particularly wise: Go easier on the graphics and loosen the corporate reins on content contributors.

"We chopped the graphics in half," says Daus, who, it should be repeated, works for Silicon *Graphics*. "Although they were fun and beautiful, the functionality [of the larger graphics] was horrendous."

The second part of SGI's strategy — loosening those reins — involved Junction team members ditching their PR hats in favor of a **"corporate journalism model."** Daus and Banks insist this is neither an oxymoron nor a joke. SGI communications staffers are expected to act like reporters, not parrots, when writing about the company's internal goings-on. The theory — and it's a good one — is that workers won't bother using an intranet if all they're going to see there is fluff.

Banks and Daus have written a book on this subject, ***Beyond Spin,*** which will be available from Simon & Schuster in the fall.

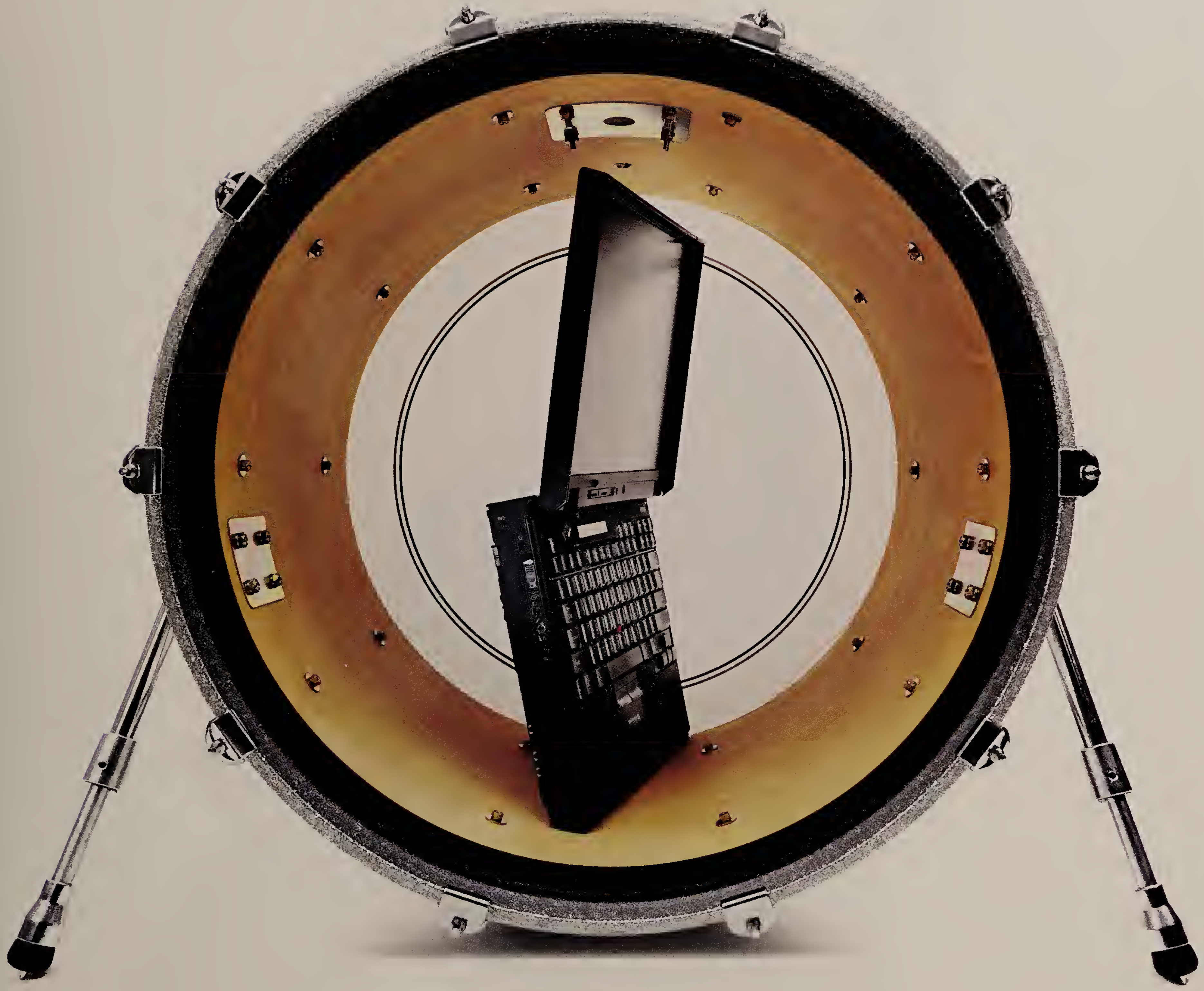
The let's-be-more-candid approach has met with pockets of resistance in upper management at SGI, Banks acknowledges.

"They're used to the Pravda way of communicating, and moving them away from that is difficult," he says.

Wow. Candor like that can get a guy reassigned to the Siberia Office at most companies.

E-tattle on your favorite Internet companies by contacting McNamara at (508) 820-7471 or pmcnamara@nww.com.

intel inside
pentium® II

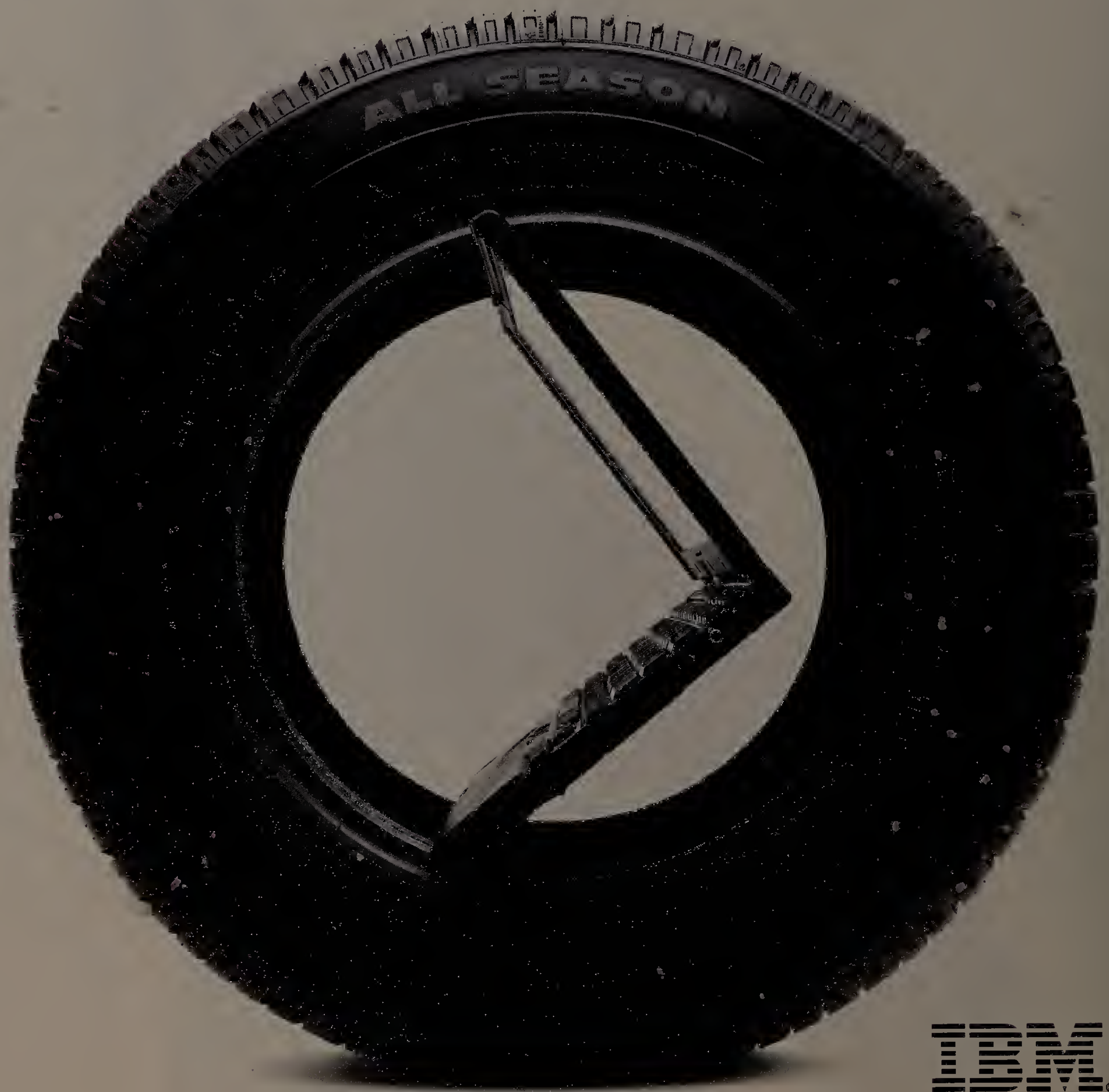


	media	power	bytes	price	workstation
ThinkPad® 770	14.1" active matrix display hot-swappable dvd SRS 3-D sound Dolby® Digital output	mobile Pentium® II processor 300 mhz 256kb level 2 cache	14.1gb hard drive 128mb memory	$4,899*	Windows NT® Workstation ready

e-business tools

	mobility	price	speed	bytes	options	e-business tools
ThinkPad® 560	4.2 lbs† 1.2" thin	$2,799*	mobile Pentium® II processor 300 mhz	6.4gb hard drive 64mb memory	external cd drive port replicator	

thinkpad.road trip



IBM®

www.ibm.com/thinkpad or 800 426 7255, ext. 5029